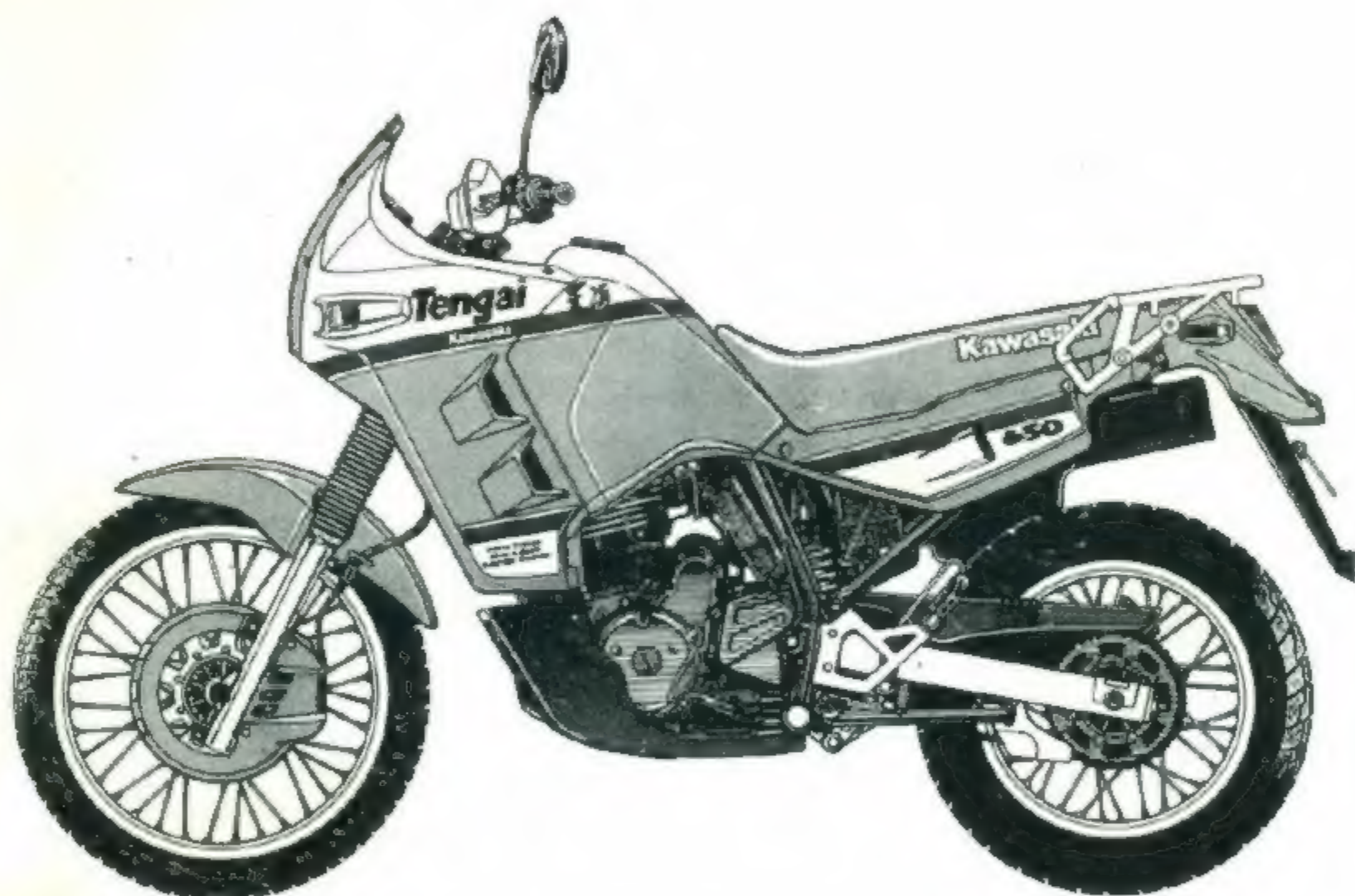


Kawasaki

Tengai



**Motorcycle
Service Manual**

Quick Reference Guide

General Information	1
Fuel System	2
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This quick reference guide will assist you in locating a desired topic or procedure.

- Bend the pages back to match the black tab of the desired chapter number with the black tab on the edge at each table of contents page.

- Refer to the sectional table of contents for the exact pages to locate the specific topic required.



Tengai

Motorcycle Service Manual

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No liability can be accepted for any inaccuracies or omissions in this publication, although every possible care has been taken to make it as complete and accurate as possible.

The right is reserved to make changes at any time without prior notice and without incurring an obligation to make such changes to products manufactured previously. See your Motorcycle dealer for the latest information on product improvements incorporated after this publication.

All information contained in this publication is based on the latest product information available at the time of publication. Illustrations and photographs in this publication are intended for reference use only and may not depict actual model component parts.

LIST OF ABBREVIATIONS

A	ampere(s)	lb	pounds(s)
ABDC	after bottom dead center	m	meter(s)
AC	alternating current	min	minute(s)
ATDC	after top dead center	N	newton(s)
BBDC	before bottom dead center	Pa	pascal(s)
BDC	bottom dead center	PS	horsepower
BTDC	before top dead center	psi	pound(s) per square inch
°C	degree(s) Celcius	r	revolution
DC	direct current	rpm	revolution(s) per minute
F	farad(s)	TDC	top dead center
°F	degree(s) Fahrenheit	TIR	total indicator reading
ft	foot, feet	V	volt(s)
g	gram(s)	W	watt(s)
h	hour(s)	Ω	ohm(s)
L	liter(s)		



This warning may apply to any of the following components or any assembly containing one or more of these components:-

Brake Shoes or Pads
Clutch Friction Material
Gaskets
Insulators

SAFETY INSTRUCTIONS

- Operate if possible out of doors or in a well ventilated place.
- Preferably use hand tools or low speed tools equipped, if necessary, with an appropriate dust extraction facility. If high speed tools are used, they should always be so equipped.
- If possible, dampen before cutting or drilling.
- Dampen dust and place it in properly closed receptacle and dispose of it safely.

Read OWNER'S MANUAL before operating.

EMISSION CONTROL INFORMATION

To protect the environment in which we all live, Kawasaki has incorporated crankcase emission (1) and exhaust emission (2) control systems in compliance with applicable regulations of the United States Environmental Protection Agency and California Air Resources Board. Additionally, Kawasaki has incorporated an evaporative emission control system (3) in compliance with applicable regulations of the California Air Resources Board on vehicles sold in California only.

1. Crankcase Emission Control System

This system eliminates the release of crankcase vapors into the atmosphere. Instead, the vapors are routed through an oil separator to the intake side of the engine. While the engine is operating, the vapors are drawn into combustion chamber, where they are burned along with the fuel and air supplied by the carburetion system.

2. Exhaust Emission Control System

This system reduces the amount of pollutants discharged into the atmosphere by the exhaust of this motorcycle. The fuel and ignition systems of this motorcycle have been carefully designed and constructed to ensure an efficient engine with low exhaust pollutant levels.

3. Evaporative Emission Control System

Vapors caused by fuel evaporation in the fuel system are not vented into the atmosphere. Instead, fuel vapors are routed into the running engine to be burned, or stored in a canister when the engine is stopped. Liquid fuel is caught by a vapor separator and returned to the fuel tank.

The Clean Air Act, which is the Federal law covering motor vehicle pollution, contains what is commonly referred to as the Act's "tampering provisions."

"Sec. 203(a) The following acts and the causing thereof are prohibited...

- (3)(A) for any person to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title prior to its sale and delivery to the ultimate purchaser, or for any manufacturer or dealer knowingly to remove or render inoperative any such device or element of design after such sale and delivery to the ultimate purchaser.
- (3)(B) for any person engaged in the business of repairing, servicing, selling, leasing, or trading motor vehicles or motor vehicle engines, or who operates a fleet of motor vehicles knowingly to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title following its sale and delivery to the ultimate purchaser..."

(Continued on next page.)

NOTE

- The phrase "remove or render inoperative any device or element of design" has been generally interpreted as follows:
 1. Tampering does not include the temporary or rendering inoperative of devices or elements of design in order to perform maintenance.
 2. Tampering could include:
 - a. Maladjustment of vehicle components such that the emission standards are exceeded.
 - b. Use of replacement parts or accessories which adversely affect the performance or durability of the motorcycle.
 - c. Addition of components or accessories that result in the vehicle exceeding the standards.
 - d. Permanently removing, disconnecting, or rendering inoperative any component or element of design of the emission control systems.

WE RECOMMEND THAT ALL DEALERS OBSERVE THESE PROVISIONS OF FEDERAL LAW, THE VIOLATION OF WHICH IS PUNISHABLE BY CIVIL PENALTIES NOT EXCEEDING \$10,000 PER VIOLATION.

TAMPERING WITH NOISE CONTROL SYSTEM PROHIBITED

Federal law prohibits the following acts or the causing thereof: (1) The removal or rendering inoperative by any person other than for purposes of maintenance, repair, or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use, or (2) the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

Among those acts presumed to constitute tampering are the acts listed below:

- Replacement of the original exhaust system or muffler with a component not in compliance with Federal regulations.
- Removal of the muffler(s) or any internal portion of the muffler(s).
- Removal of the air box or air box cover.
- Modifications to the muffler(s) or air intake system by cutting, drilling, or other means if such modifications result in increased noise levels.

Foreword

This manual is designed primarily for use by trained mechanics in a properly equipped shop. However, it contains enough detail and basic information to make it useful to the owner who desires to perform his own basic maintenance and repair work. A basic knowledge of mechanics, the proper use of tools, and workshop procedures must be understood in order to carry out maintenance and repair satisfactorily. Whenever the owner has insufficient experience or doubts his ability to do the work, all adjustments, maintenance, and repair should be carried out only by qualified mechanics.

In order to perform the work efficiently and to avoid costly mistakes, read the text, thoroughly familiarize yourself with the procedures before starting work, and then do the work carefully in a clean area. Whenever special tools or equipment are specified, do not use makeshift tools or equipment. Precision measurements can only be made if the proper instruments are used, and the use of substitute tools may adversely affect safe operation.

For the duration of your warranty period, especially, we recommend that all repairs and scheduled maintenance be performed in accordance with this service manual. Any owner maintenance or repair procedure not performed in accordance with this manual may void the warranty.

To get the longest life out of your Motorcycle:

- Follow the Periodic Maintenance Chart in the Service Manual.
- Be alert for problems and non-scheduled maintenance.
- Use proper tools and genuine Kawasaki Motorcycle parts. Special tools, gauges, and testers that are necessary when servicing Kawasaki Motorcycles are introduced by the Special Tool Manual. Genuine parts provided as spare parts are listed in the Parts Catalog.
- Follow the procedures in this manual carefully. Don't take shortcuts.
- Remember to keep complete records of maintenance and repair with dates and any new parts installed.

How to Use this Manual

In preparing this manual, we divided the product into its major systems. These systems became the manual's chapters. All information for a particular system from adjustment through disassembly and inspection is located in a single chapter.

The Quick Reference Guide shows you all of the product's system and assists in locating their chapters. Each chapter in turn has its own comprehensive Table of Contents.

The Periodic Maintenance Chart is located in the General Information chapter. The chart gives a time schedule for required maintenance operations.

If you want spark plug information, for example, go to the Periodic Maintenance Chart first. The chart tells you how frequently to clean and gap the plug. Next, use the Quick Reference Guide to locate the Electrical System chapter. Then, use the Table of Contents on the first page of the chapter to find the Spark Plug section.

Whenever you see these WARNING and CAUTION symbols, heed their instructions! Always follow safe operating and maintenance practices.

WARNING

- This warning symbol identifies special instructions or procedures which, if not correctly followed, could result in personal injury, or loss of life.

CAUTION

- This caution symbol identifies special instructions or procedures which, if not strictly observed, could result in damage to or destruction of equipment.

This manual contains four more symbols (in addition to WARNING and CAUTION) which will help you distinguish different types of information.

NOTE

○ *This note symbol indicates points of particular interest for more efficient and convenient operation.*

● Indicates a procedural step or work to be done.

○ Indicates a procedural sub-step or how to do the work of the procedural step it follows. It also precedes the text of a WARNING, CAUTION, or NOTE.

★ Indicates a conditional step or what action to take based on the results of the test or inspection in the procedural step or sub-step it follows.

In most chapters an exploded view illustration of the system components follows the Table of Contents. In these illustrations you will find the instructions indicating which parts require specified tightening torque, oil, grease or a locking agent during assembly.

General Information

Table of Contents

Before Servicing	1-2
Model Identification	1-4
General Specifications	1-6
Periodic Maintenance Chart	1-8
Technical Information	1-9
Torque and Locking Agent	1-15
Cable, Wire, and Hose Routing	1-18

1-2 GENERAL INFORMATION

Before Servicing

Before starting to service a motorcycle, careful reading of the applicable section is recommended to eliminate unnecessary work. Photographs, diagrams, notes, cautions, warnings, and detailed descriptions have been included wherever necessary. Nevertheless, even a detail account has limitations, a certain amount of basic knowledge is also required for successful work.

Especially note the following:

(1) Dirt

Before removal and disassembly, clean the motorcycle. Any dirt entering the engine or other parts will work as an abrasive and shorten the life of the motorcycle. For the same reason, before installing a new part, clean off any dust or metal filings.

(2) Battery Ground

Remove the ground (-) lead from the battery before performing any disassembly operations on the motorcycle. This prevents:

- (a) the possibility of accidentally turning the engine over while partially disassembled.
- (b) sparks at electrical connections which will occur when they are disconnected.
- (c) damage to electrical parts.

(3) Tightening Sequence

Generally, when installing a part with several bolts, nuts, or screws, they should all be started in their holes and tightened to a snug fit. Then tighten them evenly in a cross pattern. This is to avoid distortion of the part and/or causing gas or oil leakage. Conversely when loosening the bolts, nuts, or screws, first loosen all of them by about a quarter of turn and then remove them.

Where there is a tightening sequence indication in this Service Manual, the bolts, nuts, or screws must be tightened in the order and method indicated.

(4) Torque

The torque values given in this Service Manual should always be adhered to. Either too little or too much torque may lead to serious damage. Use a good quality, reliable torque wrench.

(5) Force

Common sense should dictate how much force is necessary in assembly and disassembly. If a part seems especially difficult to remove or install, stop and examine what may be causing the problem. Whenever tapping is necessary, tap lightly using a wooden or plastic-faced mallet. Use an impact driver for screws (particularly for the removal of screws held by a locking agent) in order to avoid damaging the screw heads.

(6) Edges

Watch for sharp edges, especially during major engine disassembly and assembly. Protect your hands with gloves or a piece of thick cloth when lifting the engine or turning it over.

(7) High Flash-point Solvent

A high flash-point solvent is recommended to reduce fire danger. A commercial solvent commonly available in North America is Stoddard solvent (generic name). Always follow manufacturer and container directions regarding the use of any solvent.

(8) Gasket, O-ring

Do not reuse a gasket or O-ring once it has been in service. The mating surfaces around the gasket should be free of foreign matter and perfectly smooth to avoid oil or compression leaks.

(9) Liquid Gasket, Nonpermanent Locking Agent

Follow manufacturer's directions for cleaning and preparing surfaces where these compounds will be used. Apply sparingly. Excessive amounts may block engine oil passages and cause serious damage. An example of a non-permanent locking agent commonly available in North America is Loctite Lock'n Seal (Blue).

(10) Press

A part installed using a press or driver, such as a wheel bearing, should first be coated with oil on its outer or inner circumference so that it will go into place smoothly.

(11) Ball Bearing

When installing a ball bearing, the bearing race which is affected by friction should be pushed by a suitable driver. This prevents severe stress on the balls and races, and prevents races and balls from being dented. Press a ball bearing until it stops at the stop in the hole or on the shaft.

(12) Oil Seal and Grease Seal

Replace any oil or grease seals that were removed with new ones, as removal generally damages seals.

When pressing in a seal which has manufacturer's marks, press it in with the marks facing out. Seal should be pressed into place using a suitable driver which contacts evenly with the side of seal, until the face of the seal is even with the end of the hole.

(13) Seal Guide

A seal guide is required for certain oil or grease seals during installation to avoid damage to the seal lips. Before a shaft passes through a seal, apply a little oil, preferably high temperature grease on the lips to reduce rubber to metal friction.

(14) Circlip, Retaining Ring

Replace any circlips and retaining rings that were removed with new ones, as removal weakens and deforms them. When installing circlips and retaining rings, take care to compress or expand them only enough to install them and no more.

(15) Cotter Pin

Replace any cotter pins that were removed with new ones, as removal deforms and breaks them.

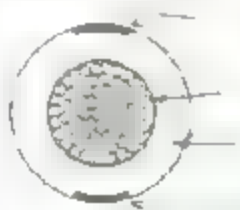
(16) Lubrication

Engine wear is generally at its maximum while the engine is warming up and before all the rubbing surfaces have an adequate lubricative film. During assembly, oil or grease (whichever is more suitable) should be applied to any rubbing surface which has lost its lubricative film. Old grease and dirty oil should be cleaned off. Deteriorated grease has lost its lubricative quality and may contain abrasive foreign particles.

Don't use just any oil or grease. Some oils and greases in particular should be used only in certain applications and may be harmful if used in an application for which they are not intended. This manual makes reference to molybdenum disulfide grease (MoS₂) in the assembly of certain engine and chassis parts. Always check manufacturer recommendations before using such special lubricants.

(17) Electrical Wires

All the electrical wires are either single color or two color and, with only a few exceptions, must be connected to wires of the same color. On any of the two color wires there is a greater amount of one color and a lesser amount of a second color, so a two color wire is identified by first the primary color and then the secondary color. For example, a yellow wire with thin red stripes is referred to as a "yellow/red" wire. It would be a "red/yellow" wire if the colors were reversed to make red the main color.

Wire (cross-section)		Name of Wire Color
	Red	Yellow/red
	Wire strands	
	Yellow	
	Red	

(18) Replacement Parts

When there is a replacement instruction, replace these parts with new ones every time they are removed. These replacement parts will be damaged or lose their original function once removed.

(19) Inspection

When parts have been disassembled, visually inspect these parts for the following conditions or other damage. If there is any doubt as to the condition of them, replace them with new ones.

Abrasion	Crack	Hardening	Warp
Bent	Dent	Scratch	Wear
Color change	Deterioration	Seizure	

(20) Service Data

Numbers of service data in this text have following meanings:

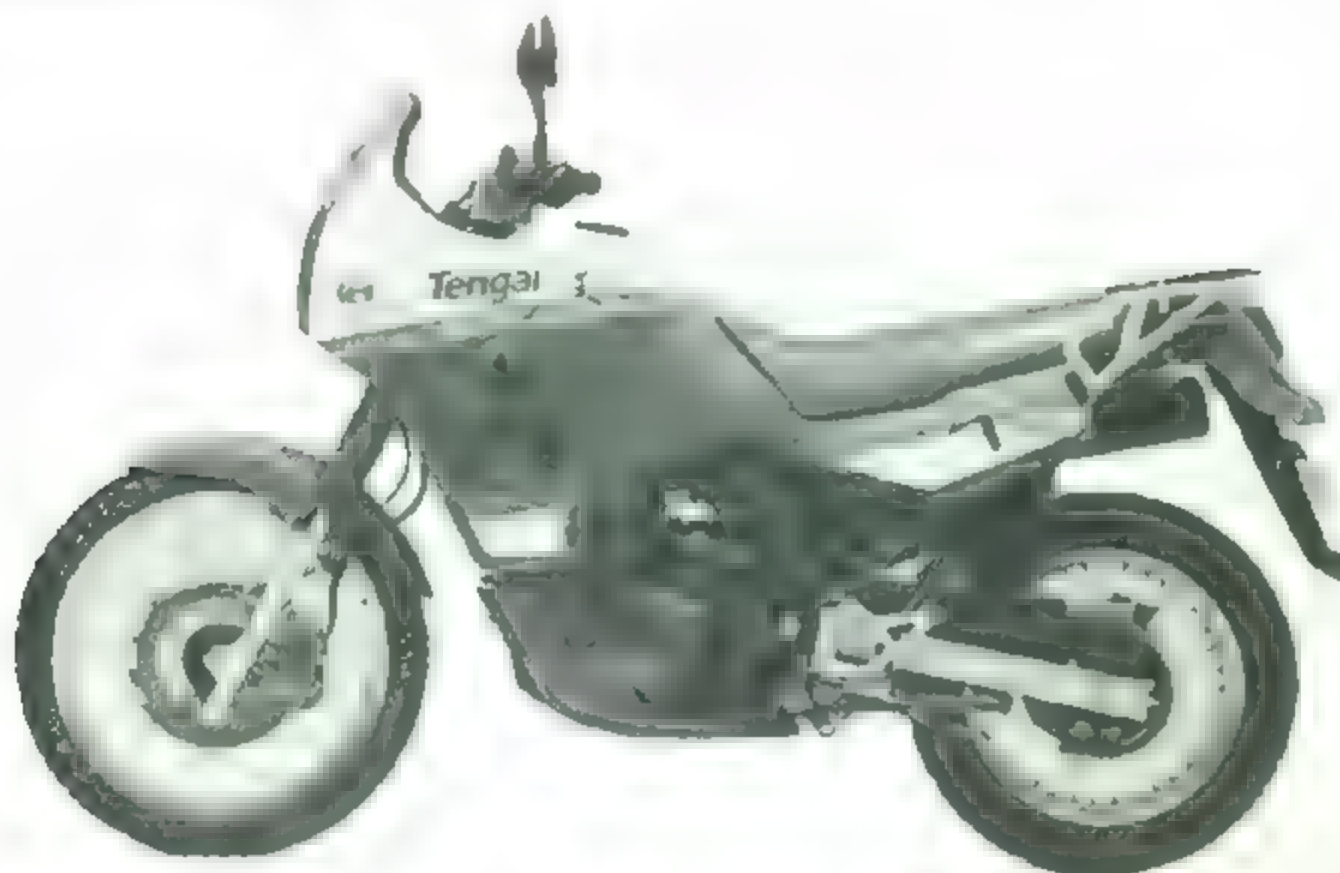
"Standard" Show dimensions or performances which brand new parts or systems have.

"Service Limit" Indicate the usable limits. If the measurement shows excessive wear or deteriorated performance, replace the damaged parts.

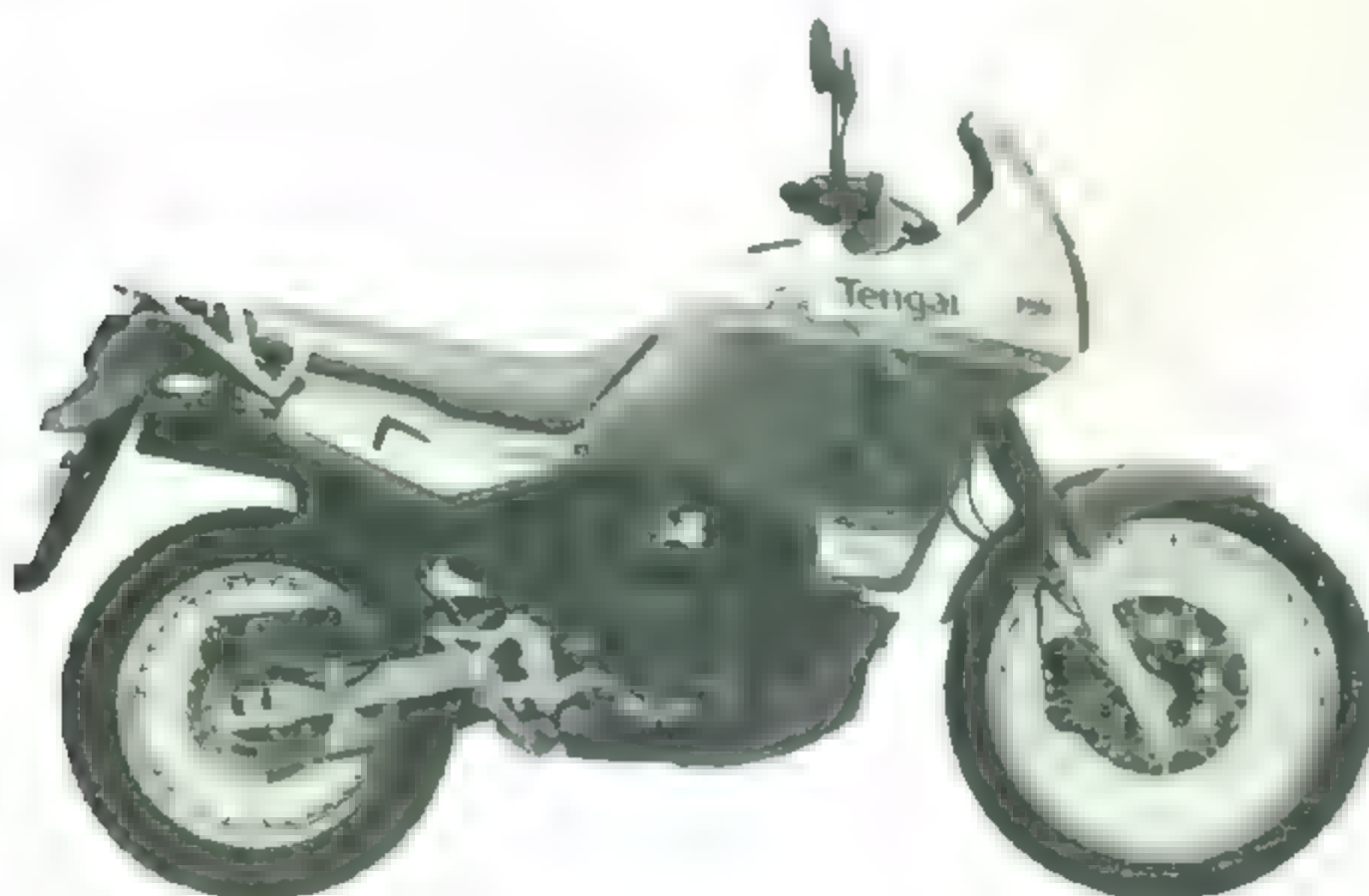
1-4 GENERAL INFORMATION

Model Identification

KL650 B1 Left Side View:



KL650-B1 Right Side View.



KL500 B1 Left Side View



KL500-B1 Right Side View



1-6 GENERAL INFORMATION

General Specifications

Items		KL650-B1	KL500-B1
Dimensions.			
Overall length		2 220 mm, (SA) 2 175 mm	↑
Overall width		920 mm	↑
Overall height		1 300 mm	↑
Wheelbase		1 480 mm	↑
Road clearance		210 mm	↑
Seat height		870 mm	↑
Dry weight		159 kg	↑
Curb weight:	Front	87 kg	↑
	Rear	97 kg	↑
Fuel tank capacity		23 L	↑
Performance			
Braking distance		12.5 m from 50 km/h	↑
Minimum turning radius		2.4 m	↑
Engine:			
Type		4-stroke, DOHC, 4-valve, 1-cylinder	←---
Cooling system		Liquid-cooled	←-
Bore and stroke		100.0 x 83.0 mm	89.0 x 80.0 mm
Displacement		651 mL	497 mL
Compression ratio		9.5 : 1	←---
Maximum horsepower		35.3 kW (48 PS) @ 6 500 r/min (rpm) (F) 34.2 kW (46.5 PS) @ 6 500 r/min (rpm). UTAC's norms (G) 19.9 kW (27 PS) @ 5 500 r/min (rpm) DIN (S) 17.2 kW (23.4 PS) @ 4 500 r/min (rpm)	29.4 kW (40 PS) @ 7 500 r/min (rpm)
Maximum torque		54.9 N-m (5.6 kg-m, 40.5 ft-lb) @ 5 500 r/min (rpm) (G) 48.1 N-m (4.9 kg-m, 35.4 ft-lb) @ 2 300 r/min (rpm) . DIN (S) 43.2 N-m, (4.4 kg-m, 31.8 ft-lb) @ 3 000 r/min (rpm)	38.2 N-m (3.9 kg-m, 28.2 ft-lb) @ 6 000 r/min (rpm)
Carburetion system		Carburetor, Keihin CVK40	←---
Starting system		Electric Starter	↑
Ignition system		CDI	↑
Timing advance		Electronically advanced	↑
Ignition timing		From 10° BTDC @ 1 300 r/min (rpm) to 30° BTDC @ 3 300 r/min (rpm)	←---
Spark plug		NGK DPR8EA-9 or ND X24EPR-U9 (I)(SA) NGK DP8EA-9, or ND X24EP-U9	↑
Valve timing			
Inlet	Open	19° (BTDC)	↑
	Close	69° (ABDC)	↑
	Duration	268°	↑...
Exhaust	Open	57° (BBDC)	↑
	Close	31° (ATDC)	↑
	Duration	268°	↑
Lubrication system		Forced lubrication (wet sump)	↑
Engine oil.			
Grade		SE or SF class	↑
Viscosity		SAE10W40, 10W50, 20W40, or 20W50	←---
Capacity		2.5 L	↑

GENERAL INFORMATION 1-7

Item	KL650-B1	KL500-B1
Drive Train:		
Primary reduction system		
Type	Gear	←---
Reduction ratio	2.272 (75/33)	←---
Clutch type	Wet multi disc	←---
Transmission		
Type	5-speed, constant mesh, return shift	←---
Gear ratios		
1st	2.266 (34/15)	←---
2nd	1.529 (26/17)	←---
3rd	1.181 (26/22)	←---
4th	0.954 (21/22)	←---
5th	0.791 (19/24)	←---
Final drive system		
Type	Chain drive	←----
Reduction ratio	2.866 (43/15)	3.133 (47/15)
Overall drive ratio	5.157 @Top gear	5.637 @Top gear
Frame:		
Type	Tubular, semi-double cradle	←----
Caster (rake angle)	28°	←----
Trail	113 mm	←----
Front tire		
Type	Tube type	←----
Size	90/90-21 54S	←----
Rear tire		
Type	Tube type	←----
Size	130/80-17 65S	←----
Front suspension		
Type	Telescopic air fork (pneumatic)	←----
Wheel travel	220 mm	←----
Rear suspension		
Type	Swing arm (uni-trak)	←----
Wheel travel	200 mm	←----
Brake type		
Front	Single disc	←---
Rear	Single disc	←---
Electrical Equipment:		
Battery	12 V 14 Ah	←----
Headlight		
Type	Semi-sealed beam	←----
Bulb	12 V 60/55 W (quartz halogen)	←----
Tail/brake light	12 V 5/21 W, (SA) 12 V 8/27 W	←----
Alternator		
Type	Three-phase AC	←----
Rated output	14 A @8 000 r/min (rpm), 14 V	←----

Specifications subject to change without notice and may not apply to every country.

Abbreviation

(F) : French Model
(G) : West German Model
(I) : Italian Model

(S) : Swiss Model
(SA) : South African Model

1-8 GENERAL INFORMATION

Periodic Maintenance Chart

The scheduled maintenance must be done in accordance with this chart to keep the motorcycle in good running condition. The initial maintenance is vitally important and must not be neglected.

OPERATION	FREQUENCY	Which ever comes first ↓ Every	ODOMETER READING						See Page
			800 km	5,000 km	10,000 km	15,000 km	20,000 km	25,000 km	
Spark plug — clean			•	•	•	•	•	•	15-21
Spark plug — check*			•	•	•	•	•	•	15-21
Valve clearance — check*		•		•		•		•	4-16
Air cleaner element — clean		•		•		•		•	2-15
Air cleaner element — replace	5 cleanings				•		•		2-15
Throttle grip play — check*		•		•		•		•	2-6
Idle speed — check*		•	•	•	•	•	•	•	2-9
Fuel system — check*				•		•		•	2-11
Spark arrestor (C, US) — clean			•	•	•	•	•	•	—
Evaporative emission control system (Cal) — change*		•	•	•	•	•	•	•	
Engine oil — change	year	•		•		•		•	6-6
Oil filter — replace		•		•		•		•	6-6
Radiator hoses, connections — check*	year	•		•		•		•	3-13
Coolant — change	2 years							•	3-5
Fuel hose — replace	4 years								—
Balancer chain tension — adjust		•	•	•	•	•	•	•	5-17
Clutch — adjust		•	•	•	•	•	•	•	5-6
Drive chain wear — check*			•	•	•	•	•	•	10-5
Drive chain — lubricate	300 km								10-5
Drive chain slack — check*	800 km								10-4
Brake lining or pad wear — check*			•	•	•	•	•	•	11-8
Brake fluid level — check*	month	•	•	•	•	•	•	•	11-13
Brake fluid — change	2 years				•				11-13
Brake hose — replace	4 years								11-16
Brake master cylinder cup and dust seal — replace	2 years								11-11
Caliper piston seal and dust seal — replace	2 years								11-8
Brake light switch — check*		•	•	•	•	•	•	•	15-34
Steering — check*		•	•	•	•	•	•	•	13-4
Steering stem bearing — lubricate	2 years					•			13-7
Front fork oil — change								•	12-5
Tire wear — check*			•	•	•	•	•	•	9-9
Spoke tightness and rim runout — check*		•	•	•	•	•	•	•	9-6
Swing arm pivot, uni-trak linkage — lubricate				•		•		•	12-3
Battery electrolyte level — check*	month	•	•	•	•	•	•	•	15-11
General lubrication — perform			•	•	•	•	•	•	16-8
Nut, bolt, and fastener tightness — check*		•		•		•		•	1-15

* For higher odometer readings repeat at the frequency interval established here

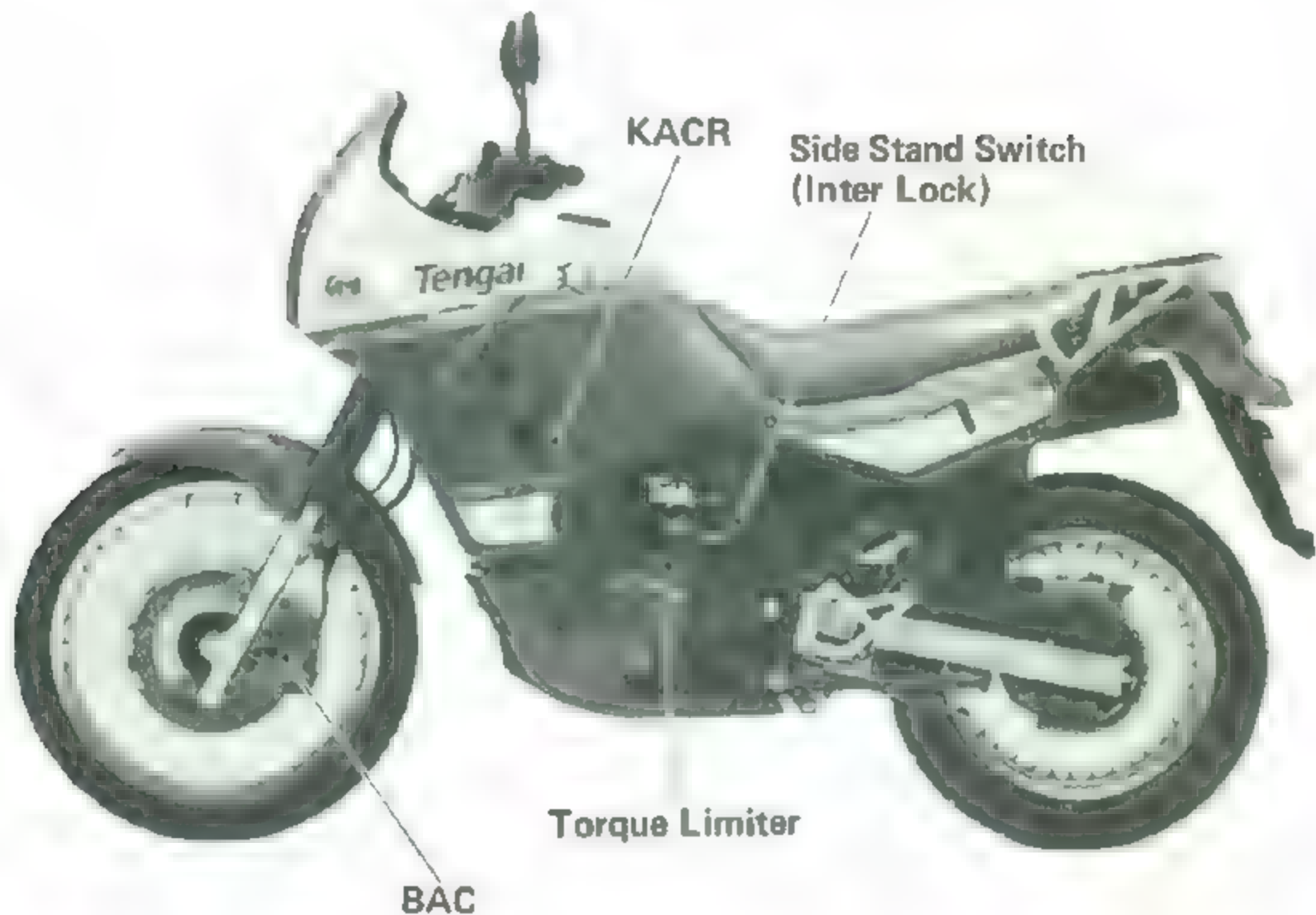
• : Replace, add, adjust, clean, or torque if necessary

(C) : Canadian Model

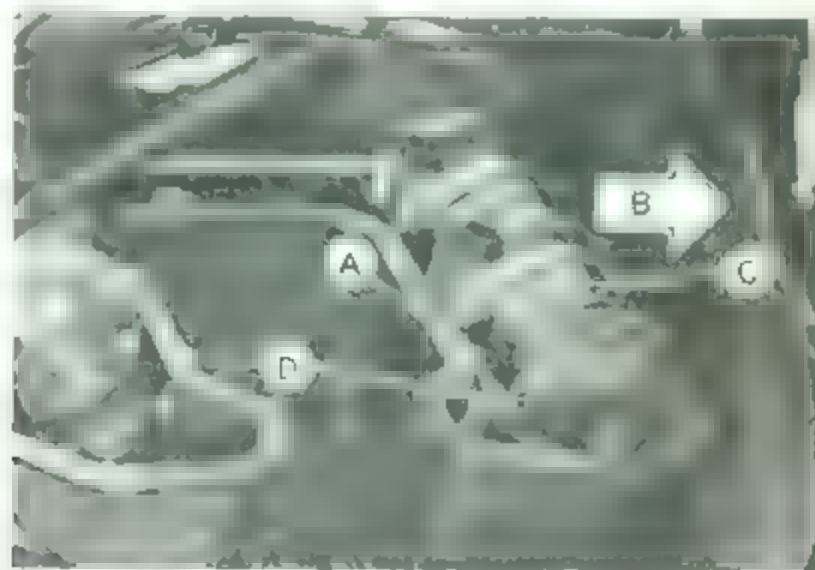
(Cal) : California Vehicle

(US) : US Model

Technical Information

**KACR (Kawasaki Automatic Compression Release)**

The device momentarily opens one of the exhaust valves on the compression stroke at very low speeds. This allows some of the compression pressure to escape, making it easy to turn over the engine during starting. Due to the simplicity of the mechanism, no periodic maintenance is needed.

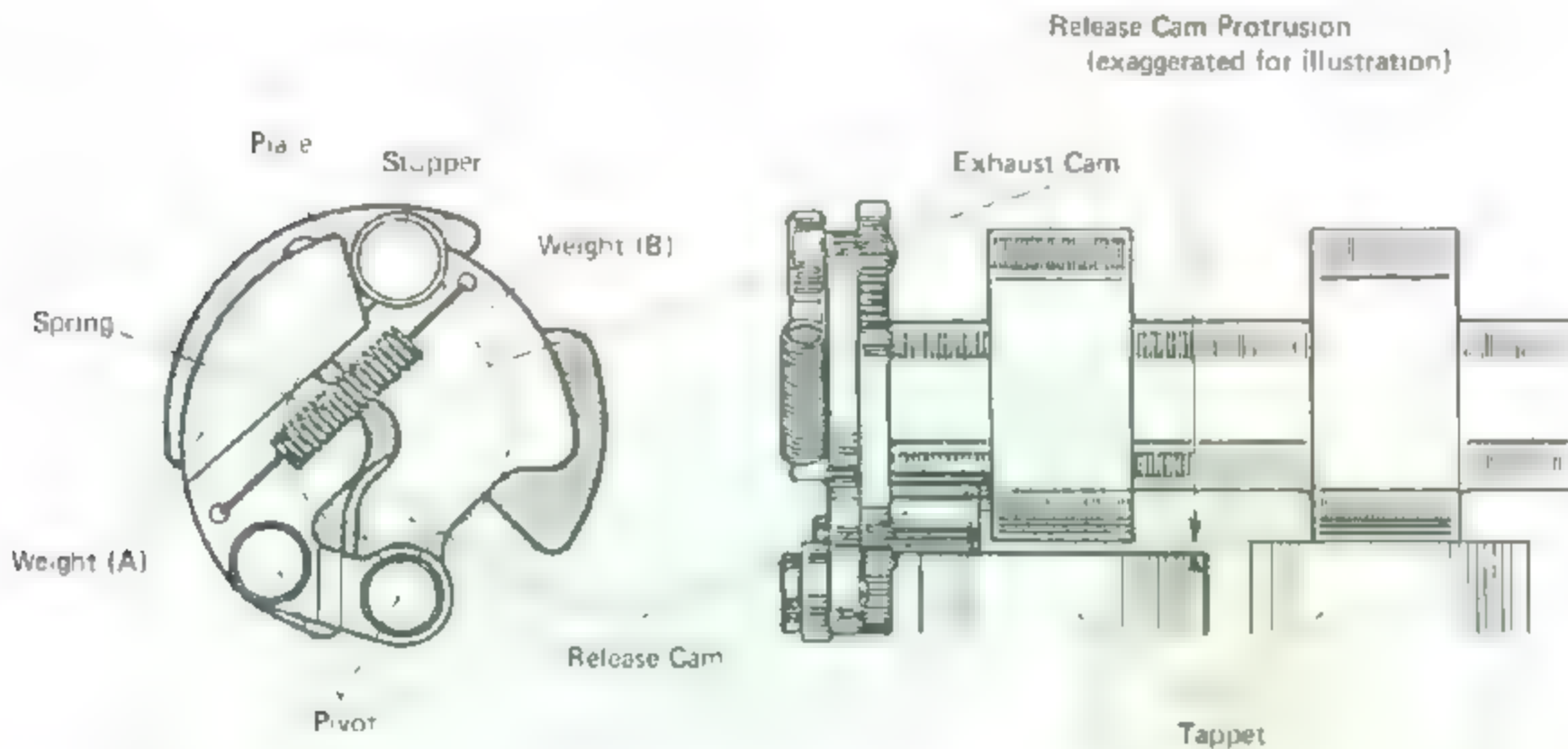


- A Right Hand Exhaust Valve
- B Front
- C Exhaust Cam Lobe
- D KACR Unit

1-10 GENERAL INFORMATION

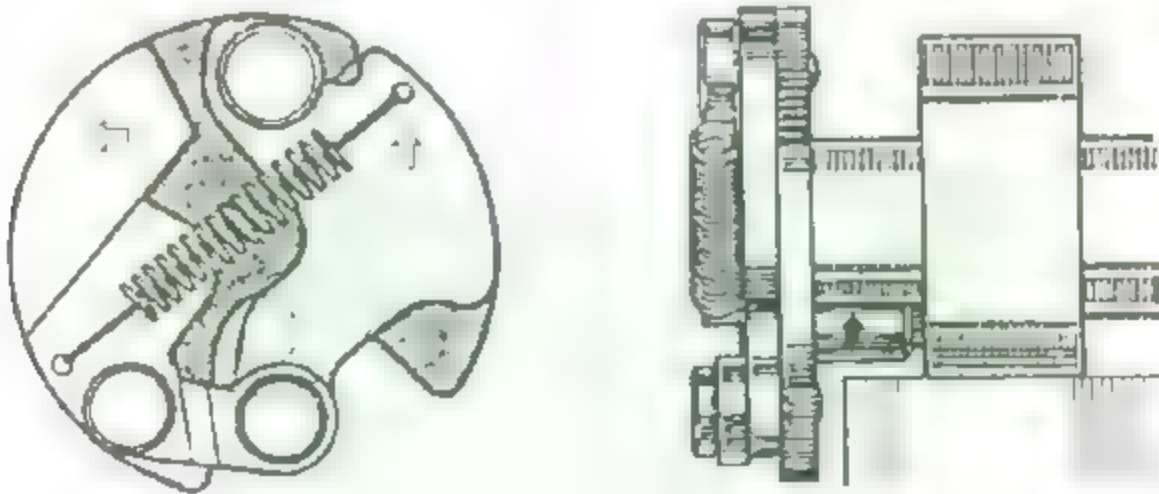
Operation

The KACR mechanism is fixed to the end of the exhaust camshaft and rotates with it. When the engine is turning at very low speeds (cranking speeds), the weights are pulled together by the spring.



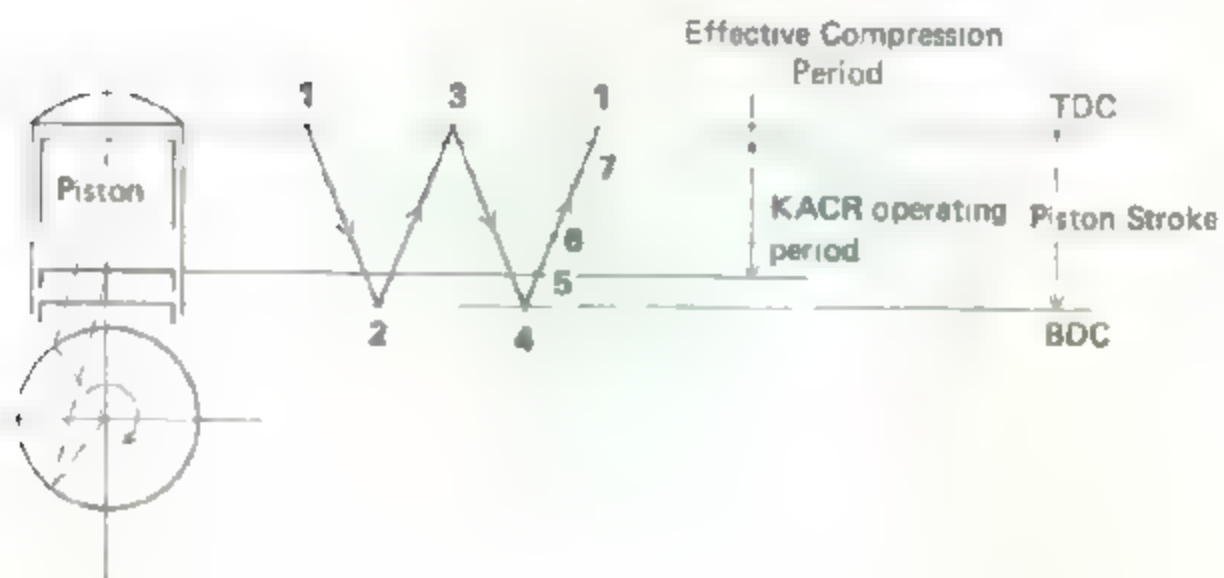
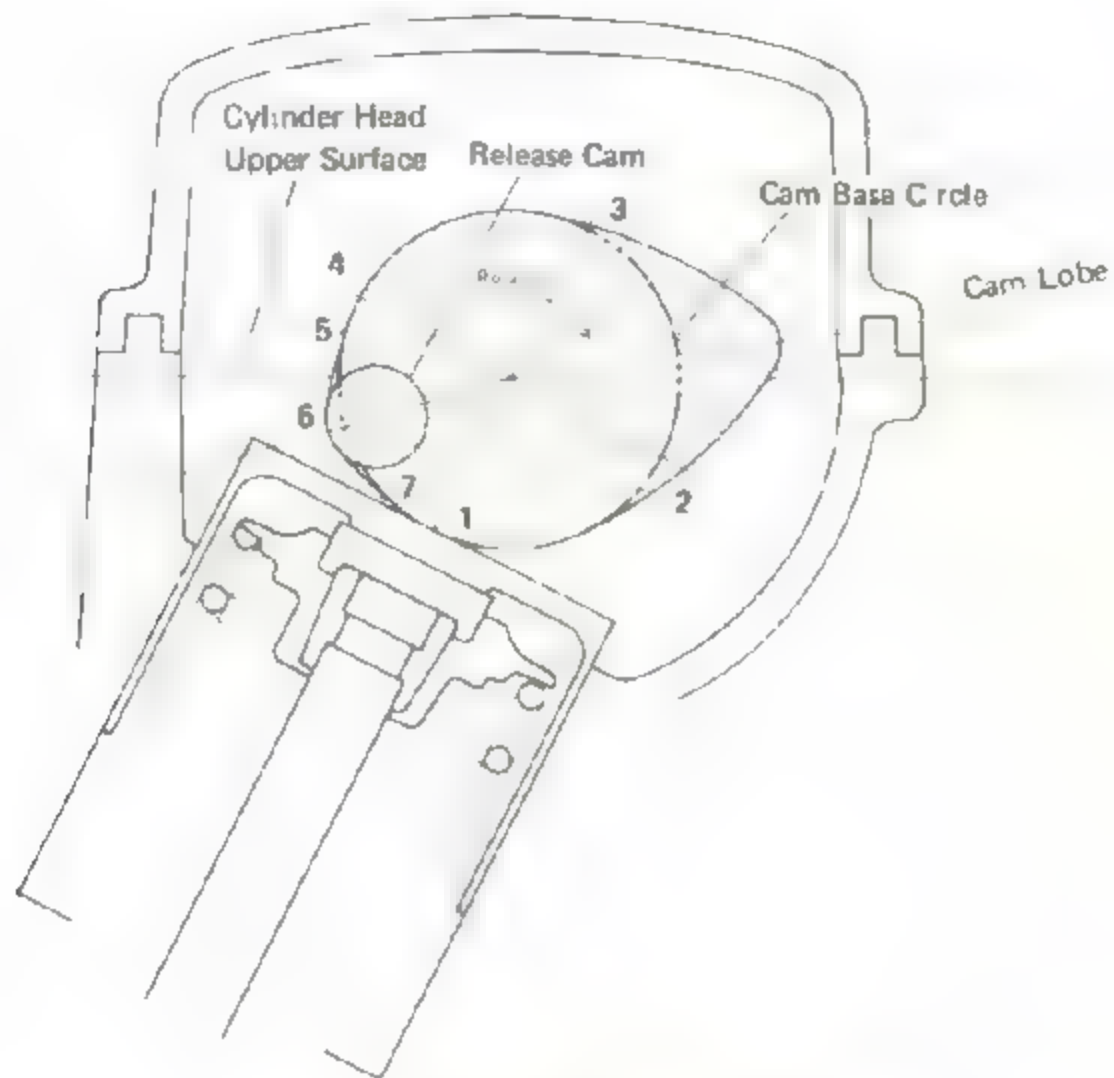
The release cam on weight (B) protrudes beyond the base circle of the exhaust cam lobe. Weight (B) resets against a stopper pin mounted on the KACR plate so that when the release cam forces the right hand exhaust valve open the weights don't fly apart. Since the release cam is very small, it opens the exhaust valve only for a very short part of the compression stroke before top dead center. Weight (A) pivots on the KACR plate and weight (B) pivots on weight (A).

When the engine starts weight (B) swings away from the center of the KACR plate until it is free of the stopper pin. This allows weight (A) to swing out and move the pivot of weight (B) toward the center of the cam lobe.



This in turn moves the release cam inside the base circle of the cam lobe where it no longer opens the right hand exhaust valve. The stopper pin holds weight (B) from going too far out. Of course, when the engine slows to a stop, the weights return to their original positions and the release cam can again hold open the valve.

The release cam operates following after the piston movement and the exhaust cam movement as shown in the figure below

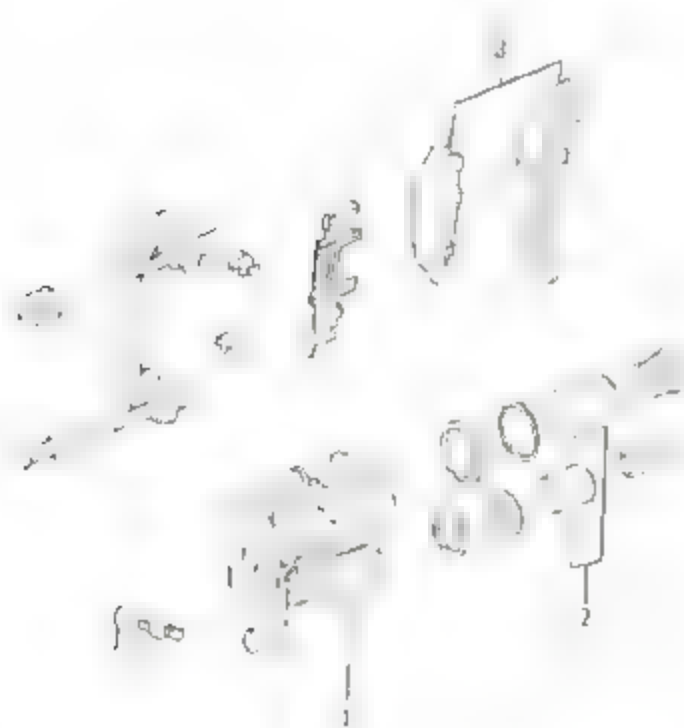


- 1 → 2 Power Stroke
- 2 → 3 Exhaust Stroke
- 3 → 4 Intake Stroke
- 4 → 1 Compression Stroke

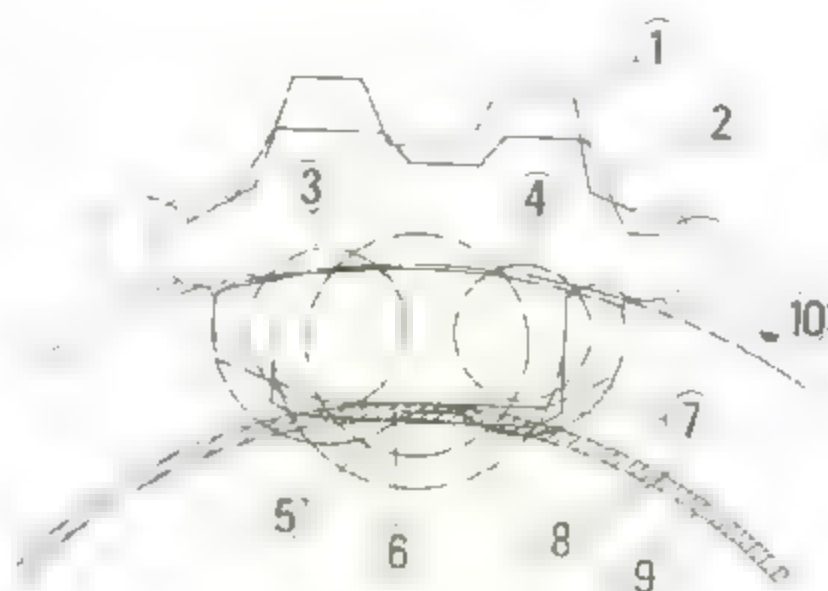
1-12 GENERAL INFORMATION

BAC (Balanced Actuation Caliper)

The front disc brake employs the BAC (Balanced Actuation Caliper) system. The disc brake caliper has one small piston and one large one. The small piston is on leading edge of the pad where less pressure is needed because the leading edge tries to "dig in" by itself when the brake is applied.



- 1. Caliper Body
- 2. Pistons
- 3. Pads



- 1. Conventional Type Caliper
- 2. 2 piston Type Caliper
- 3. Trailing side Piston
- 4. Leading-side Piston
- 5. Conventional Type Piston

- 6. 2-piston Type Pad
- 7. Conventional Type Pad
- 8. Disc
- 9. Reduceable Disc Area
- 10. Disc Rotational Direction



Balanced actuation means better pad wear, and better brake feel under extreme racing conditions.

Torque Limiter

The crankshaft is likely to rotate in the opposite direction during engine starting due to reduce the engine rpm by compression pressure or firing pressure at the BTDC in the compression stroke. In this case starter mechanism may be damaged by large back torque from the crankshaft.

To prevent this damage the starter mechanism employs the torque limiter. The torque limiter is a kind of friction clutch which consists of a shaft, large gear, small gear, conical spring washer and shim(s).

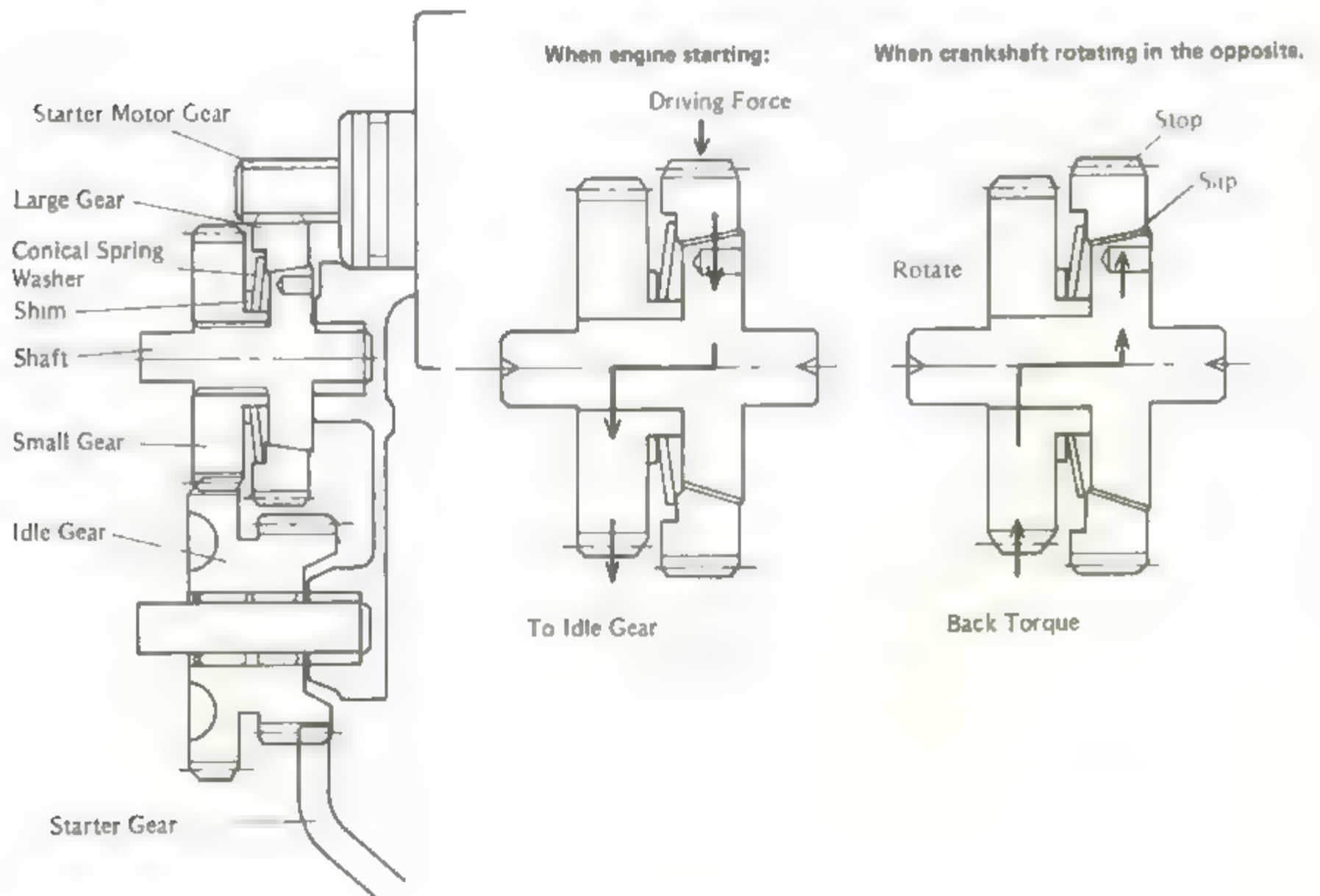
Operation

When engine starting

The driving force of the starter motor is transmitted from the large gear of the torque limiter to the idle gear through the shaft and small gear. And the force is transmitted to the starter gear rotates the crankshaft.

When crankshaft rotating in the opposite

The back torque from the crankshaft is transmitted from the starter gear to the shaft and small gear of the torque limiter through the idle gear. If the torque is over the clutch capacity of the torque limiter, the torque is not transmitted to the large gear because of the slip between the shaft and the large gear.



1-14 GENERAL INFORMATION

Side Stand Switch (Inter Lock)

Side stand switch is designed so that the motorcycle does not run when side stand is up. The side stand switch is operated by the side stand and kills the engine by stopping ignition sparks.

Operation

Side stand switch is closely related with starter lockout switch and neutral switch as inter lock system. These switches are connected with ignition circuit and control the ignition system as follows (see Ignition System Wiring Diagram in the Electrical System chapter).

Side Stand Switch	Starter Lockout Switch	Neutral Switch	Starter Starting	Engine Ignition
When side stand is down	When clutch lever is pulled in	ON	○	○
		OFF	○	○
	When clutch lever is released	ON	○	○
		OFF	X	X
When side stand is up	When clutch lever is pulled in	ON	○	○
		OFF	○	○
	When clutch lever is released	ON	○	○
		OFF	X	○

Torque and Locking Agent

Tighten all bolts and nuts to the proper torque using an accurate torque wrench. An insufficiently tightened bolt or nut may become damaged or fall off, possibly resulting in damage to the motorcycle and injury to the rider. A bolt or nut which is overtightened may become damaged, strip an internal thread or break and then fall out. The following table lists the tightening torque for the major bolts and nuts and the parts requiring use of a non-permanent locking agent or liquid gasket.

When checking the tightening torque of the bolts and nuts, first loosen the bolt or nut by half a turn and then tighten it to the specified torque.

Letters used in the "Remarks" column mean

- L Apply a non-permanent locking agent to the threads.
- LG Apply liquid gasket to the threads.
- SS Apply silicone sealant to the threads.
- S Tighten the fasteners following the specified sequence.

Fastener	Torque			Remarks
	N-m	kg-m	ft-lb	
Cooling System:				
Fan Switch	7.4	0.75	65 in-lb	SS
Water Temperature Sensor	15	1.5	11.0	
Water Pump Impeller Nut	9.8	1.0	7.0	
Coolant Drain Plug	9.8	1.0	7.0	
Engine Top End:				
Cylinder Head Cover Bolts	7.8	0.8	69 in-lb	SS
Water Temperature Sensor	15	1.5	11.0	
Camshaft Cap Bolts	12	1.2	8.5	S
Camshaft Sprocket Bolts	4.9	5.0	36	L
Cylinder Head Bolts (10 mm)	65	6.6	48	S
Cylinder Head Bolts (6 mm)	9.8	1.0	7.0	S
Cylinder Head Nuts (8 mm)	25	2.5	18.0	S
Cylinder Head Allen Bolt (8 mm)	18	1.8	13.0	S
Cylinder Nuts	25	2.5	18.0	S
Cylinder Bolt	9.8	1.0	7.0	S
Engine Right Side/Left Side:				
Oil Passage plug	23	2.3	16.5	
Clutch Hub Nut	130	13.5	98	
Clutch Spring Bolts	9.8	1.0	7.0	
Clutch Cover Damper Mounting Bolts	9.8	1.0	7.0	
Shift Drum Cam Allen Bolt	12	1.2	8.5	L
Return Spring Pin	25	2.5	18.0	L
Primary Gear Nut	120	12.0	87	L
Magneto Cover Damper Mounting Bolts	9.8	1.0	7.0	
Magnet Flywheel Bolt	195	20	145	
Starter Motor Mounting Bolts	9.8	1.0	7.0	
Starter Clutch Allen Bolts	34	3.5	25	L
Balancer Inside Chain Guide Bolt (8 mm)	25	2.5	18.0	L
Balancer Inside Chain Guide Bolt (6 mm)	12	1.2	8.5	L
Balancer Front Right Weight Nut	44	4.5	33	

1-16 GENERAL INFORMATION

Fastener	Torque			Remarks
	N-m	kg-m	ft-lb	
Engine Lubrication System:				
Camshaft Cap Bolts	12	1.2	8.5	S
Oil Pipe Banjo Bolts	20	2.0	14.5	
Oil Passage Plug	23	2.3	16.5	
Oil Pressure Relief Valve	15	1.5	11.0	L
Engine Oil Drain Plug	23	2.3	16.5	
Oil Pump Cover Screw	—	—	—	L
Engine Removal/Installation:				
Swing Arm Pivot Nut	98	10.0	72	
Engine Mounting Nuts	44	4.5	33	
Engine Bracket Nuts	25	2.5	18.0	
Cylinder Head Bracket Bolt	25	2.5	18.0	
Cylinder Head Bracket Nuts	25	2.5	18.0	
Crankshaft/Transmission:				
Bearing Holding Plate Mounting Screws (for crankshaft bearings in both crank case halves and driveshaft bearing and shift drum bearing in right crankcase half)	—	—	—	L
Wheels/Tires:				
Front Axle Nut	78	8.0	58	
Rear Axle Nut	93	9.5	69	
Spoke Nipples	2.0 ~ 3.9	0.2 ~ 0.4	17 ~ 35 in-lb	
Final Drive:				
Engine Sprocket Bolts	98	1.0	7.0	
Rear Sprocket Nuts	32	3.3	24	
Rear Coupling Studs	—	—	—	L
Swing Arm Pivot Nut	98	10.0	72	
Tie-Rod Upper Mounting Nut	98	10.0	72	
Rear Axle Nut	93	9.5	69	
Brakes:				
Brake Hose Banjo Bolts	25	2.5	18.0	
Front Reservoir Cap Screws	1.5	0.15	13 in-lb	
Brake Lever Pivot Locknut	5.9	0.6	52 in-lb	
Front Master Cylinder Clamp Bolts	8.8	0.9	78 in-lb	S
Front Brake Light Switch Mounting Screw	1.3	0.13	11 in-lb	
Front Caliper Mounting Bolts	33	3.3	25	
Caliper Bleed Valves (Front, Rear)	7.8	0.8	69 in-lb	
Brake Disc Mounting Bolts (Front, Rear)	23	2.3	16.5	
Brake Disc Cover Bolts (Front, Rear)	5.9	0.6	52 in-lb	
Brake Pedal Mounting Bolt	8.8	0.9	78 in-lb	
Brake Pedal Adjuster Locknut	17.2	1.75	152 in-lb	
Rear Brake Hose Clamp Mounting Screw	5.9	0.6	52 in-lb	
Rear Reservoir Mounting Bolt	5.9	0.6	52 in-lb	
Rear Master Cylinder Mounting Bolts	23	2.3	16.5	
Rear Caliper Mounting Bolts	23	2.3	16.5	
Rear Disc Cover Bracket Bolts	5.9	0.6	52 in-lb	

Fastener	Torque			Remarks
	N-m	kg-m	ft-lb	
Suspension:				
Front Fork Air Valves	12	1.2	8.5	L
Front Top Bolts	29	3.0	22	
Front Fork Upper Clamp Bolts	25	2.5	18.0	
Front Fork Lower Clamp Nuts	25	2.5	18.0	
Front Fork Oil Drain Screws	1.5	0.15	13 in. lb	LG
Front Fork Bottom Allen Bolts	39	4.0	29	L
Rear Shock Absorber Upper Mounting Bolt	59	6.0	43	
Rear Shock Absorber Lower Mounting Nut	98	10.0	72	
Swing Arm Pivot Nut	98	10.0	72	
Tie-Rod Mounting Nuts (Upper, Lower)	98	10.0	72	
Rocker Arm Pivot Nut	98	10.0	72	
Steering				
Handlebar Clamp Bolts	24	2.4	17.5	S
Steering Stem Head Nut	39	4.0	29	
Front Fork Upper Clamp Bolts	25	2.5	18.0	
Front Fork Lower Clamp Nuts	25	2.5	18.0	
Steering Stem Locknut	Hand-Tighten (about 4.9)	Hand-Tighten (about 0.5)	Hand-Tighten (about 43 in.-lb)	
Frame:				
Rear Frame Upper Mounting Bolts	25	2.5	18.0	
Rear Frame Lower Mounting Bolts	25	2.5	18.0	
Electrical System:				
Front Brake Light Switch Mounting Screw	1.3	0.13	11 in. lb	
Water Temperature Sensor	15	1.5	11.0	SS
Fan Switch	7.4	0.75	65 in. lb	
Spark Plug	14	1.4	10.0	
Magneto Flywheel Bolt	195	20	145	
Starter Motor Mounting Bolts	98	10	70	
Neutral Switch	15	1.5	11.0	

The table below, relating tightening torque to thread diameter, lists the basic torque for the bolts and nuts. Use this table for only the bolts and nuts which do not require a specific torque value. All of the values are for use with dry solvent-cleaned threads.

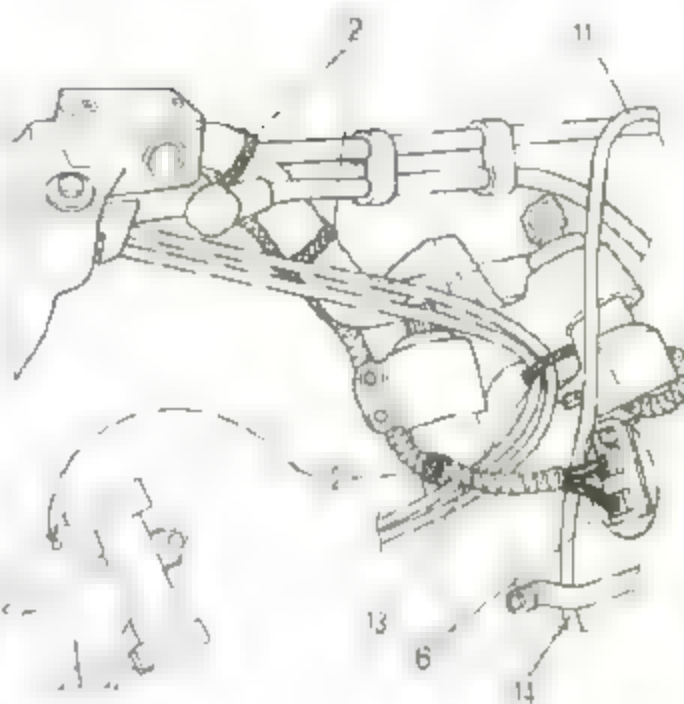
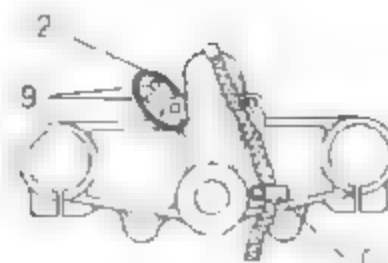
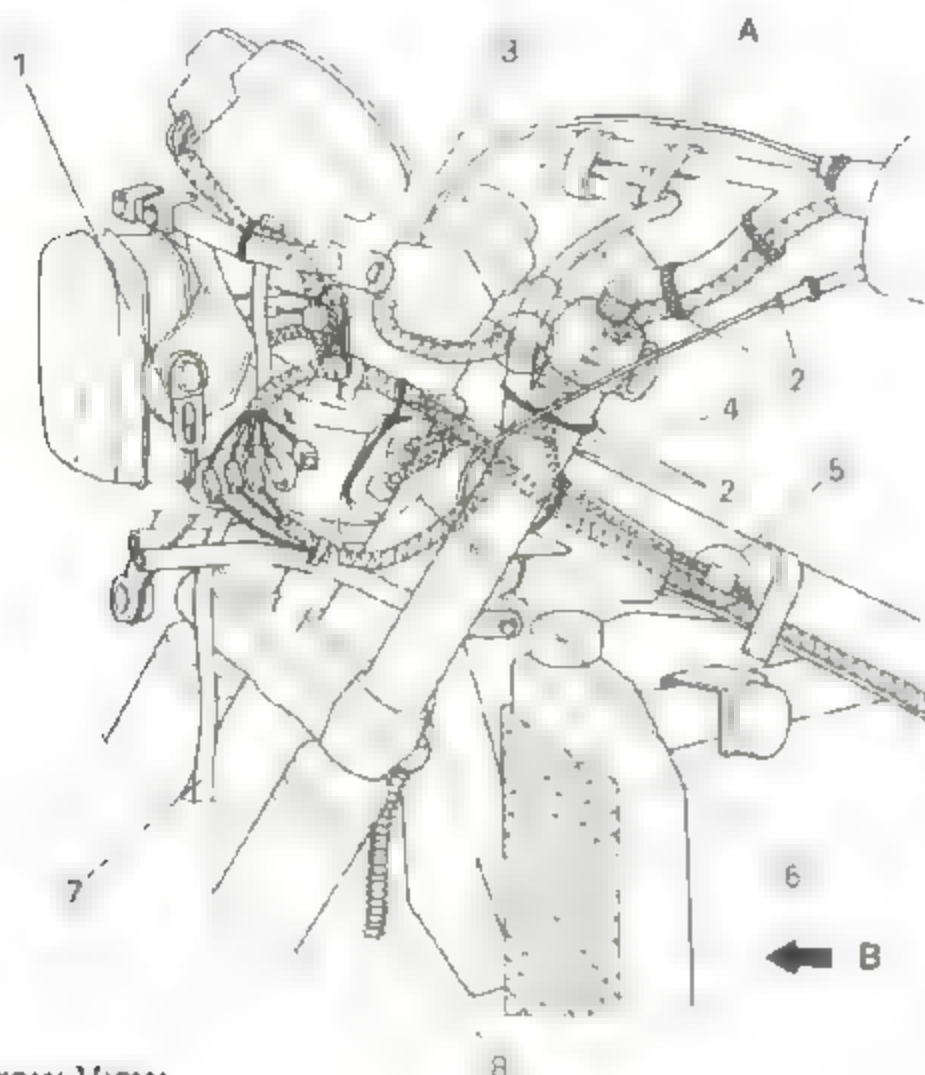
General Fasteners

Threads dia (mm)	Torque		
	N-m	kg-m	ft-lb
5	3.4 ~ 4.9	0.35 ~ 0.50	30 ~ 43 in. lb
6	5.9 ~ 7.8	0.60 ~ 0.80	52 ~ 68 in. lb
8	14 ~ 19	1.4 ~ 1.9	10.0 ~ 13.5
10	25 ~ 34	2.6 ~ 3.5	19.0 ~ 25
12	44 ~ 61	4.5 ~ 6.2	33 ~ 45
14	73 ~ 98	7.4 ~ 10.0	54 ~ 72
16	115 ~ 155	11.5 ~ 16.0	83 ~ 115
18	165 ~ 225	17.0 ~ 23.0	125 ~ 165
20	225 ~ 325	23 ~ 33	165 ~ 240

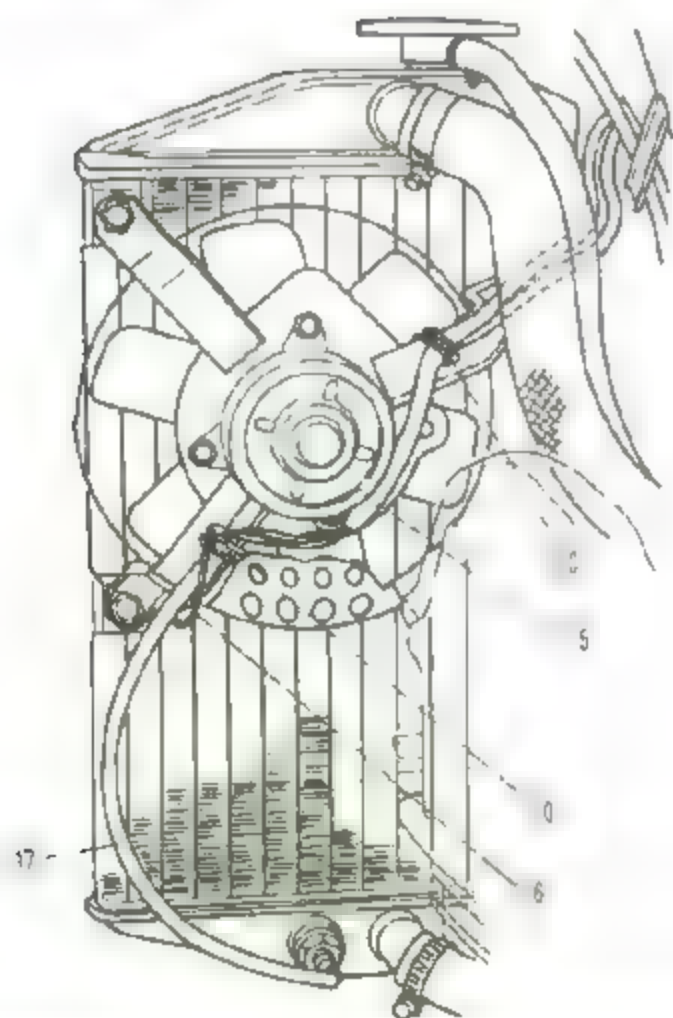
1-18 GENERAL INFORMATION

Cable, Wire, and Hose Routing

A Back View



B Arrow View



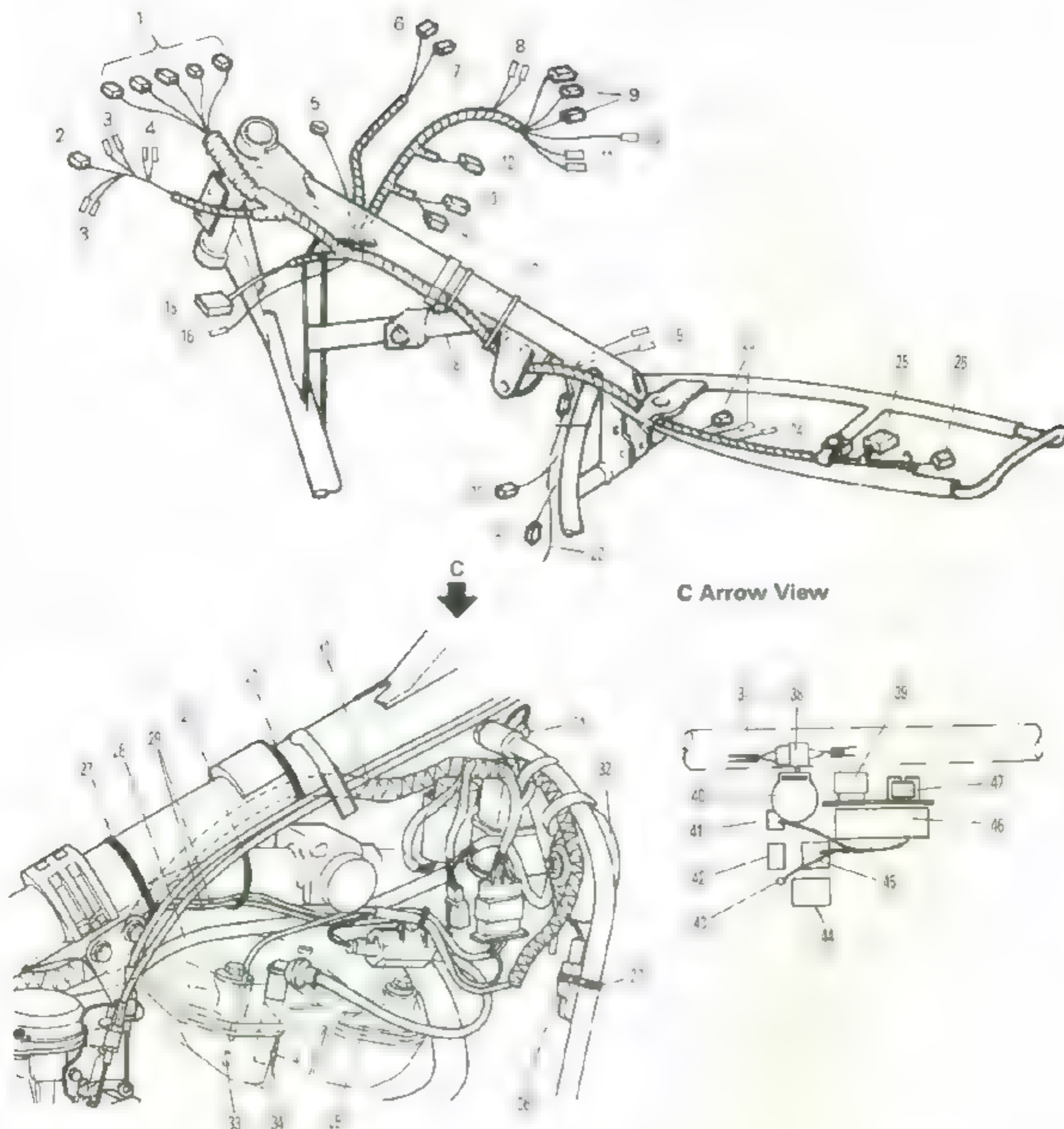
1. Clamp turn signal leads
2. Tie Band
3. Place at headlight back.
4. Clamp with brake hose and left grip harness.
5. Place at main pipe back.

6. Insert and connect into bracket
7. Speedometer Cable
8. Brake Hose
9. Throttle Cables
10. Clamp
11. Clutch Cable

12. Insert clamp into head gusset.
13. Clamp on ignition switch mounting boss.
14. Run inside of stay
15. Fan Lead

16. Fan Ground Lead
17. Fan Switch Lead

Main Harness



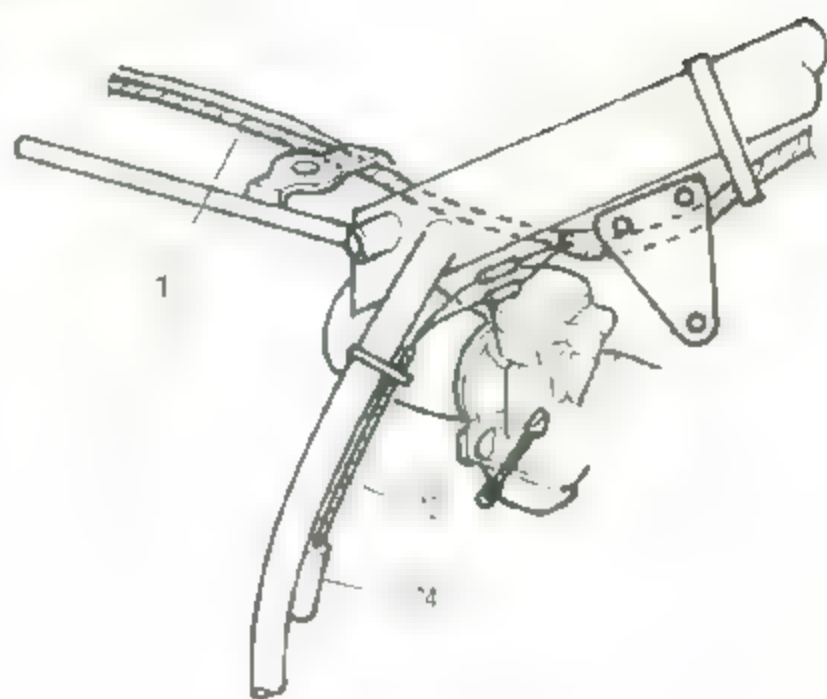
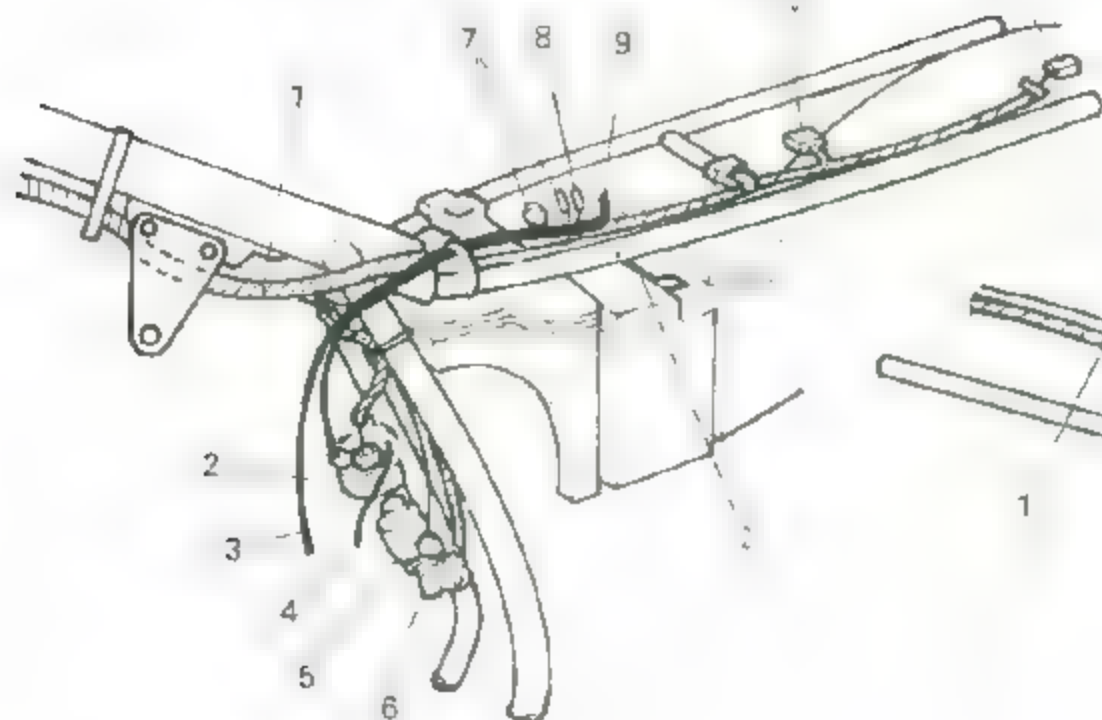
- 1. To meter Bracket
- 2. To Headlight
- 3. To Turn Signal Light
- 4. To City Light
- 5. Ground Lead
- 6. To Diode Assembly
- 7. To Turn Signal Relay
- 8. To Horn
- 9. To CDI Unit
- 10. To Water Temperature Sensor
- 11. To Ignition Coil

- 12. To Magneto
- 13. To Neutral Switch and Pickup Coil
- 14. To Fan Relay
- 15. To Radiator Fan
- 16. To Fan Switch
- 17. Main Harness
- 18. Harness Position Mark
- 19. Rear Brake Light Switch
- 20. To Starter Relay
- 21. To Starter Circuit Relay
- 22. To Side Stand Switch

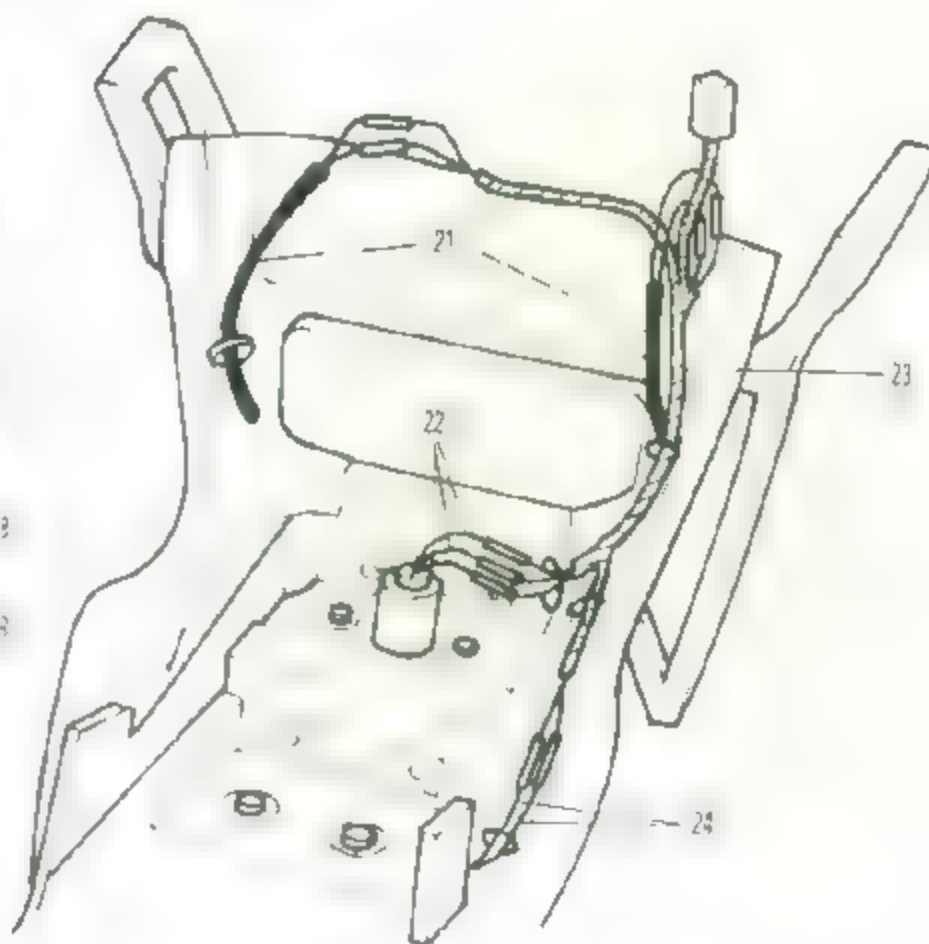
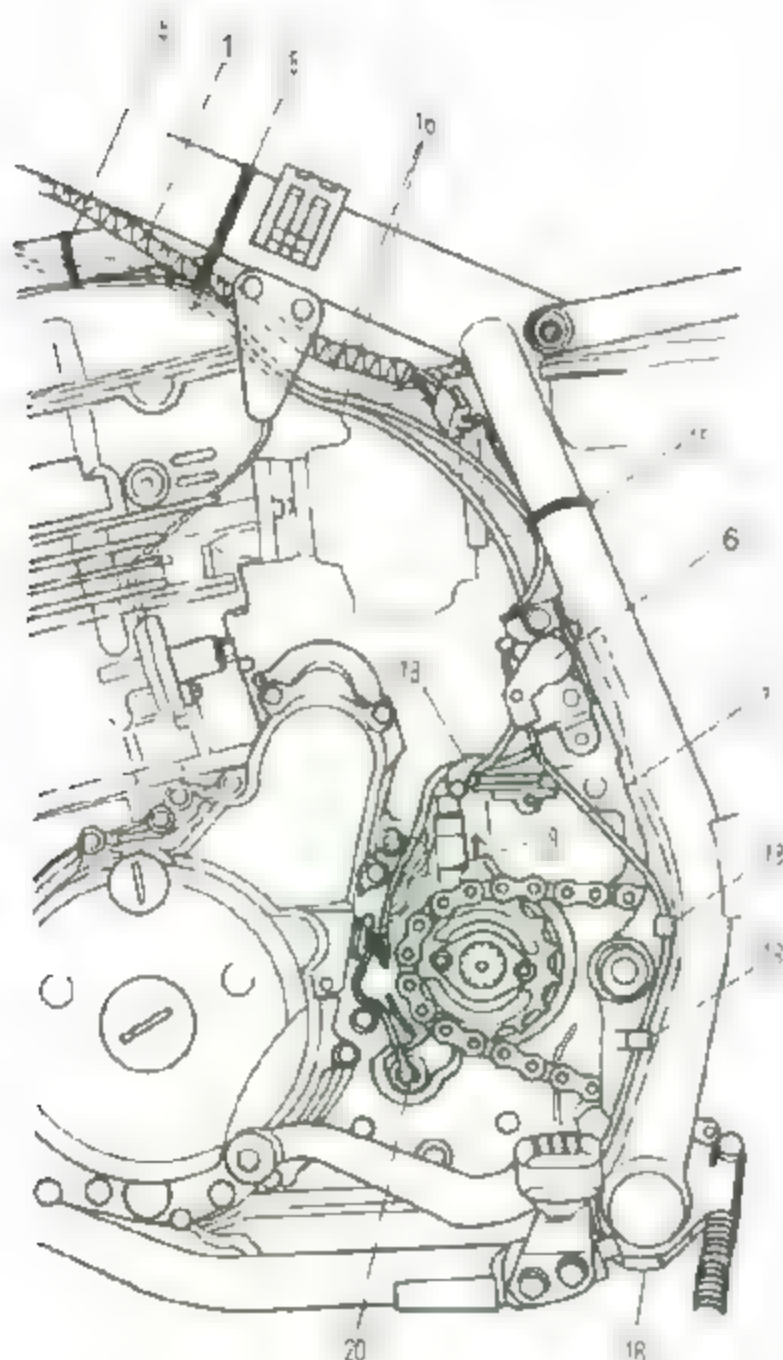
- 23. To Fuses
- 24. To Battery
- 25. To Regulator/Rectifier
- 26. To Rear Harness
- 27. Tie Band
- 28. Reservoir Air Vent Hose
- 29. Magneto Leads
- 30. Main Harness
- 31. Ground Lead
- 32. Horn
- 33. To Water Temperature Sensor
- 34. Spark Plug Cap

- 35. Ignition Coil
- 36. Fuse (for Fan)
- 37. Main Pipe
- 38. Radiator Fan Connector
- 39. Turn Signal Relay
- 40. Fan Relay
- 41. CDI Unit 2P Connector
- 42. Magneto Lead 3P Connector
- 43. CDI Unit 1P Connector
- 44. Magneto Lead 6P Connector
- 45. CDI Unit 6P Connector
- 46. CDI Unit
- 47. Diode Assembly

1-20 GENERAL INFORMATION

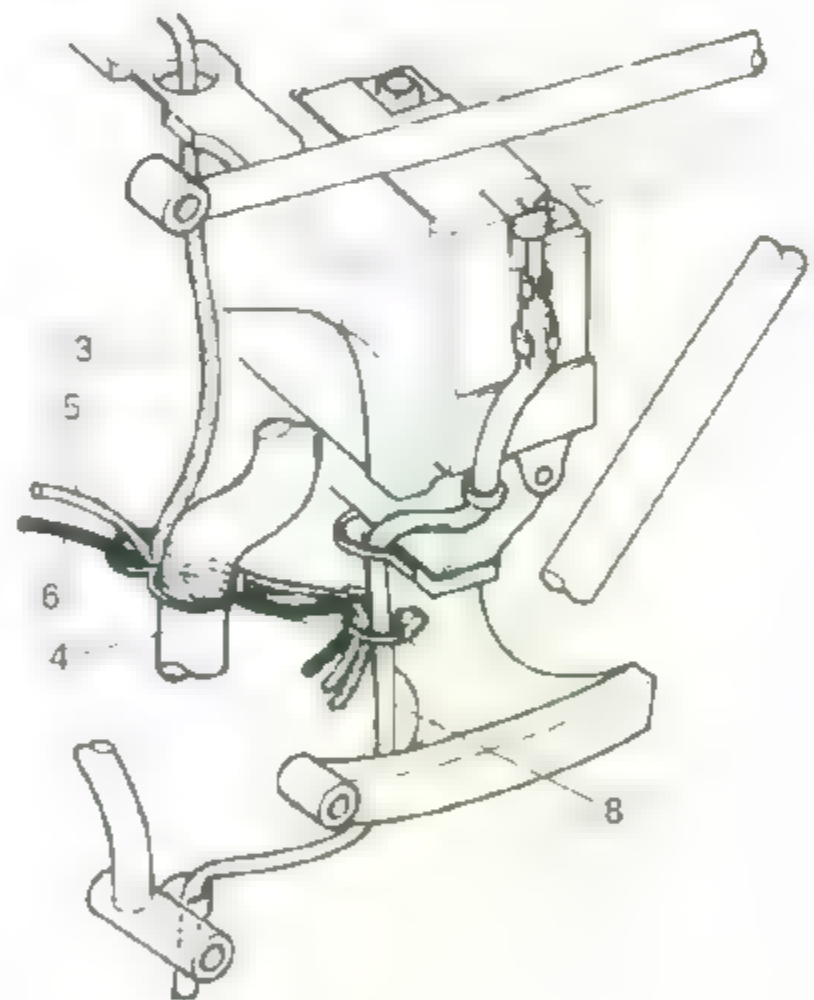
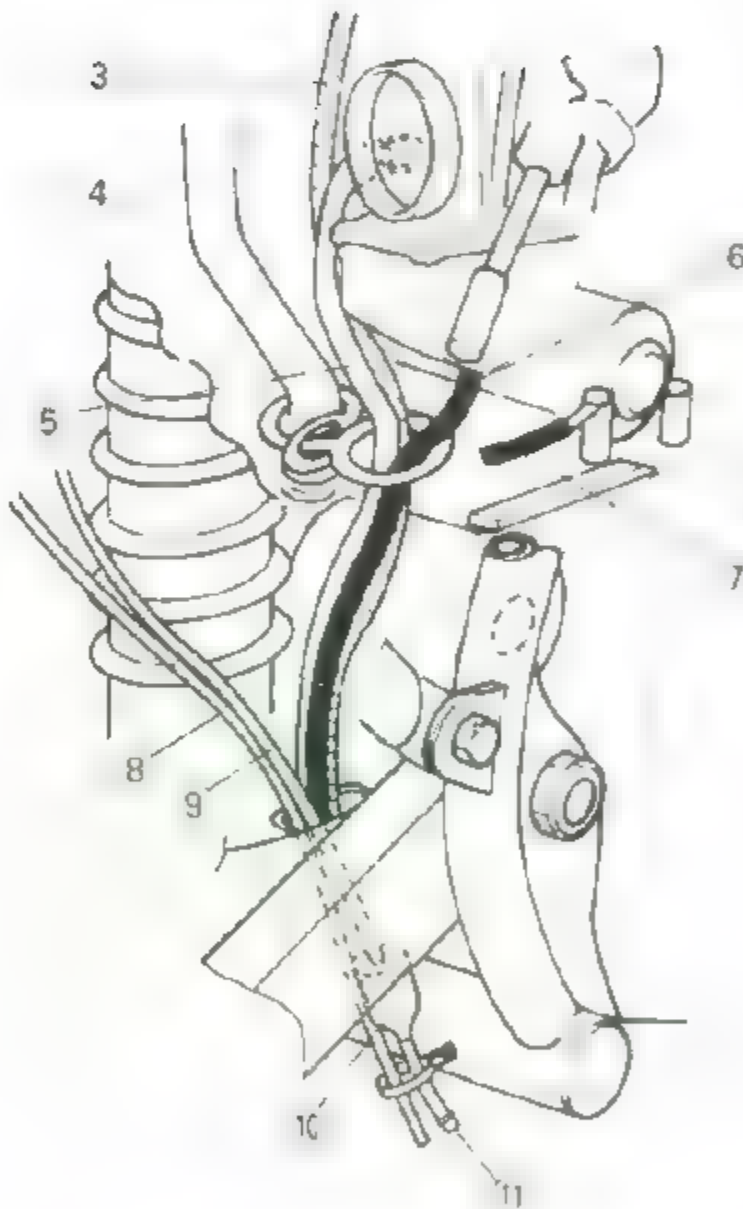
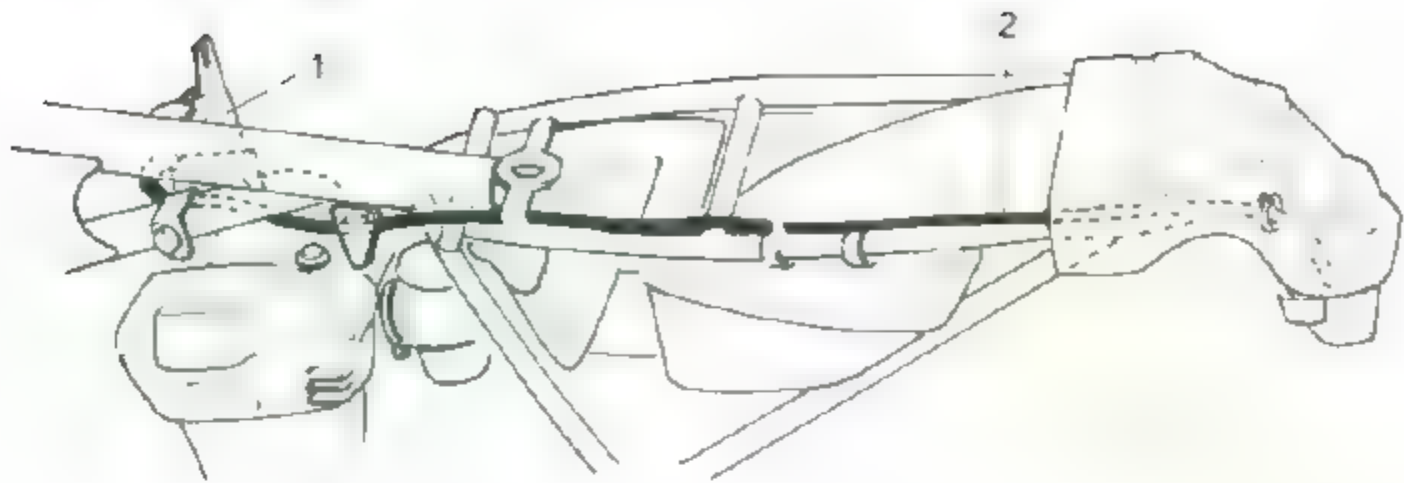


Rear Harness



- | | | | |
|--------------------------|-----------------------------|-----------------------------|------------------------------|
| 1. Main Harness | 7. To Fuses | 13. Brake Light Switch Lead | 19. Fit into groove |
| 2. Starter Relay | 8. To Battery | 14. Rear Brake Light Switch | 20. Neutral Switch Connector |
| 3. Ground Lead | 9. Battery (+) Lead | 15. Tie Band | 21. Turn Signal Light Leads |
| 4. Starter Motor Lead | 10. To Regulator, Rectifier | 16. Magneto Leads | 22. Tail Brake Light Leads |
| 5. Starter Circuit Relay | 11. To Rear Harness | 17. Side Stand Switch Cable | 23. Rear Harness |
| 6. Side Stand Switch | 12. Battery (-) Lead | 18. Clamp | 24. License Plate Light Lead |

Hoses



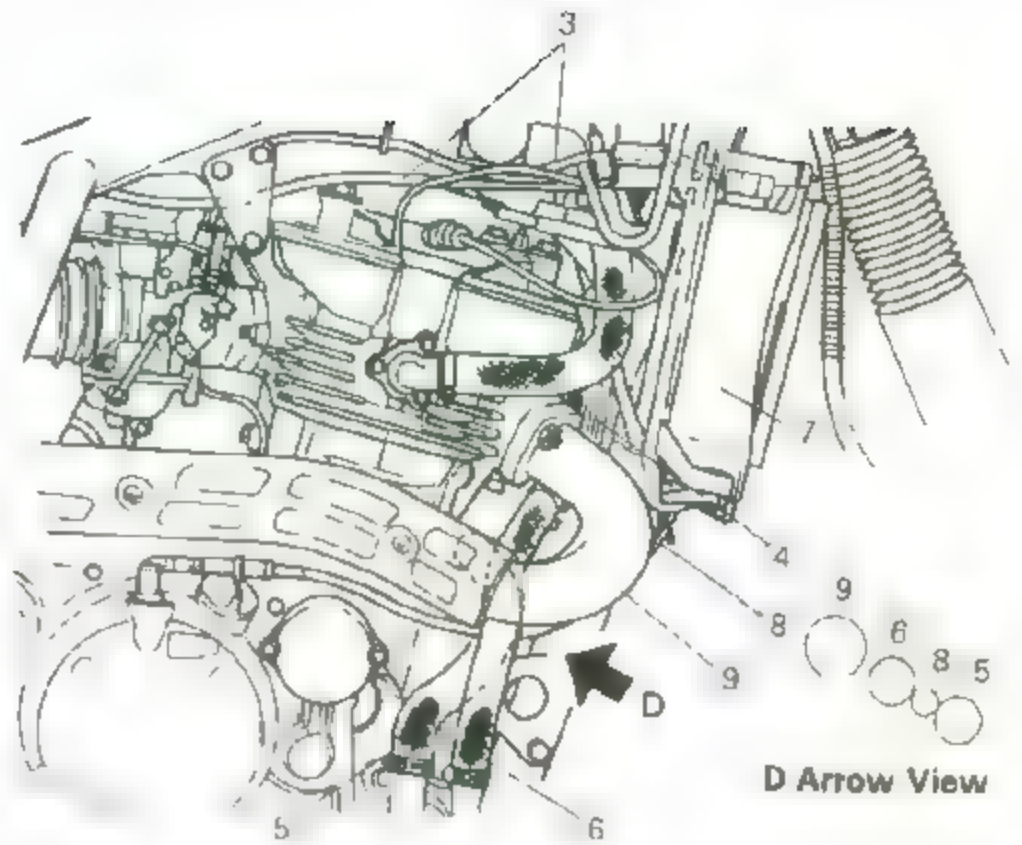
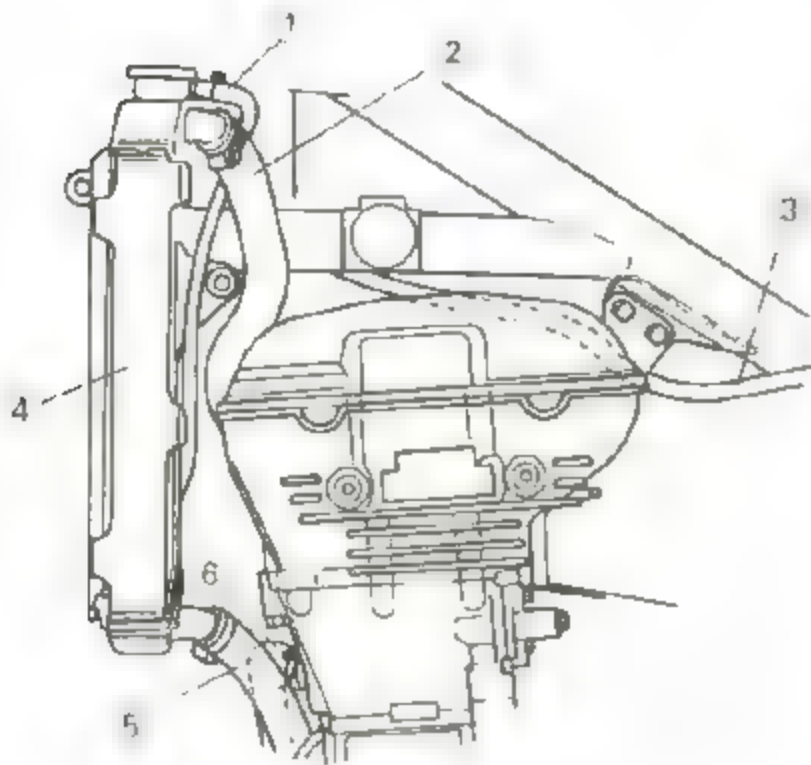
- 1 Coolant Reservoir Tank
- 2 Reservoir Air Vent Hose
- 3 Fuel Tank Breather Hose
- 4 Crankcase Breather Hose

- 5 Carburetor Air Vent Hose
- 6 Carburetor Over Flow Tube
- 7 Ground Lead
- 8 Battery Vent Hose

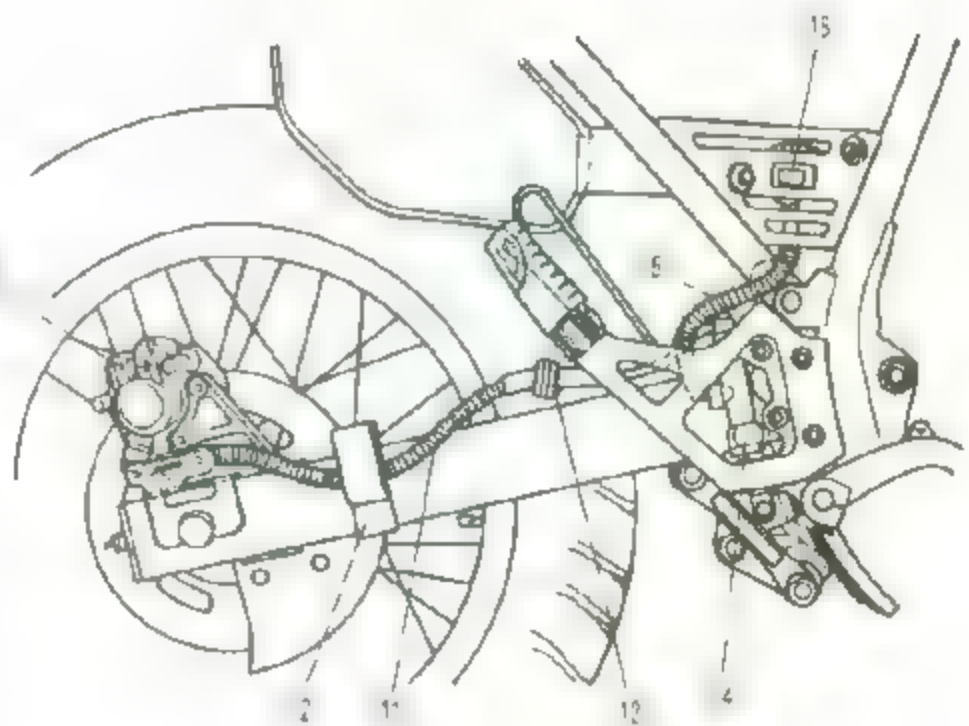
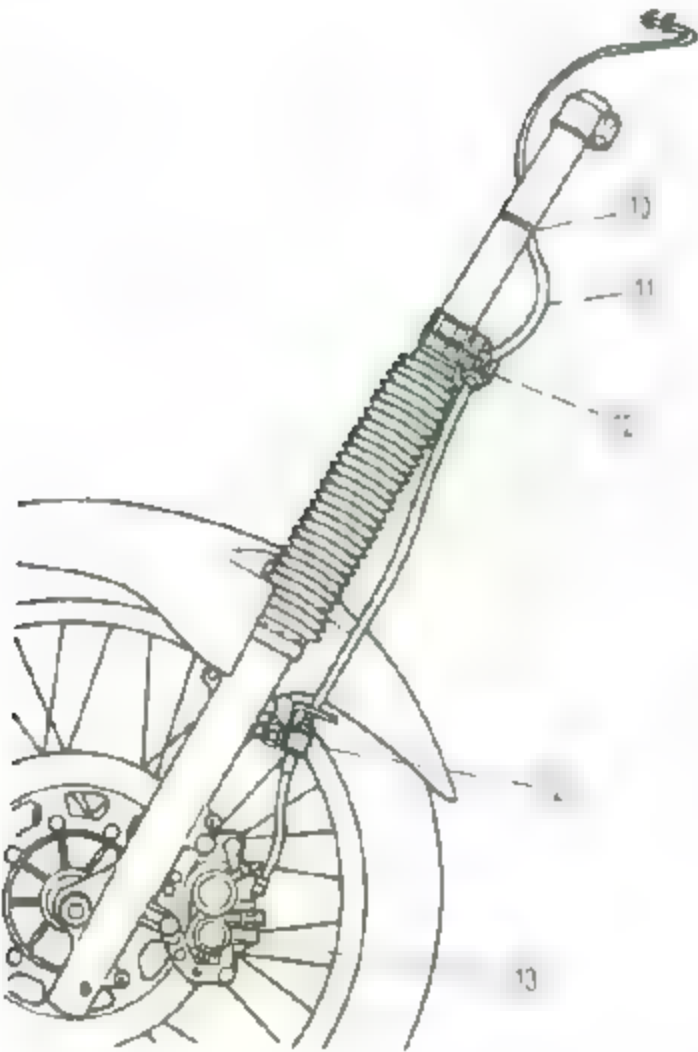
- 9 Air Cleaner Drain Hose
- 10 Oil Reservoir
- 11 Plug

1-22 GENERAL INFORMATION

Cooling Hoses



Brake Hoses



- | | | | |
|----------------------------|---------------------------|-----------------|--------------------------|
| 1. Reservoir Hose | 5. Radiator Hose | 9. Exhaust Pipe | 13. Caliper |
| 2. Water Hose | 6. Water Pump Hose | 10. Tie Band | 14. Master Cylinder |
| 3. Reservoir Air Vent Hose | 7. Coolant Reservoir Tank | 11. Brake Hose | 15. Reservoir Hose |
| 4. Radiator | 8. Clutch Cable | 12. Clamp | 16. Rear Brake Reservoir |

Fuel System

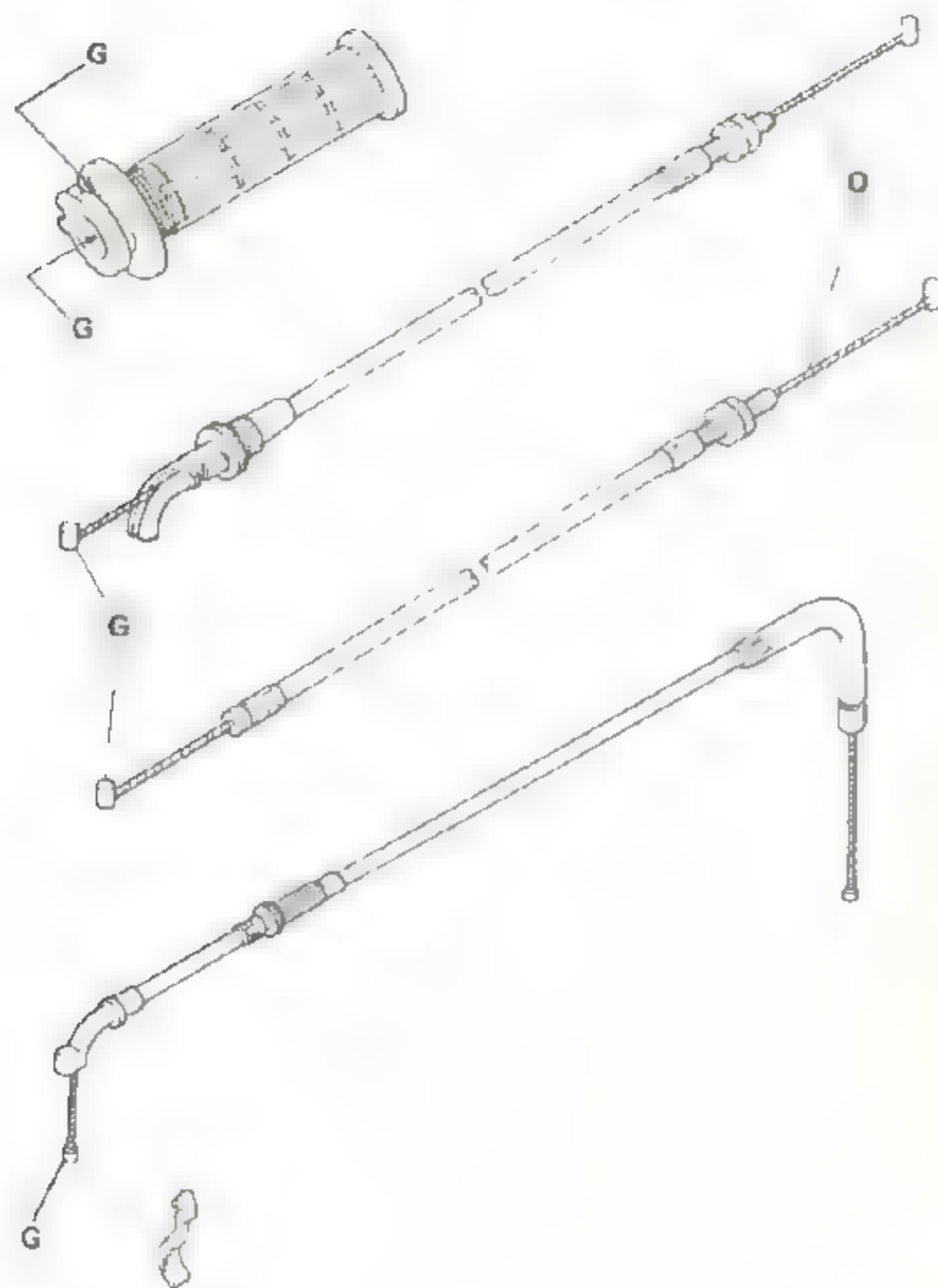


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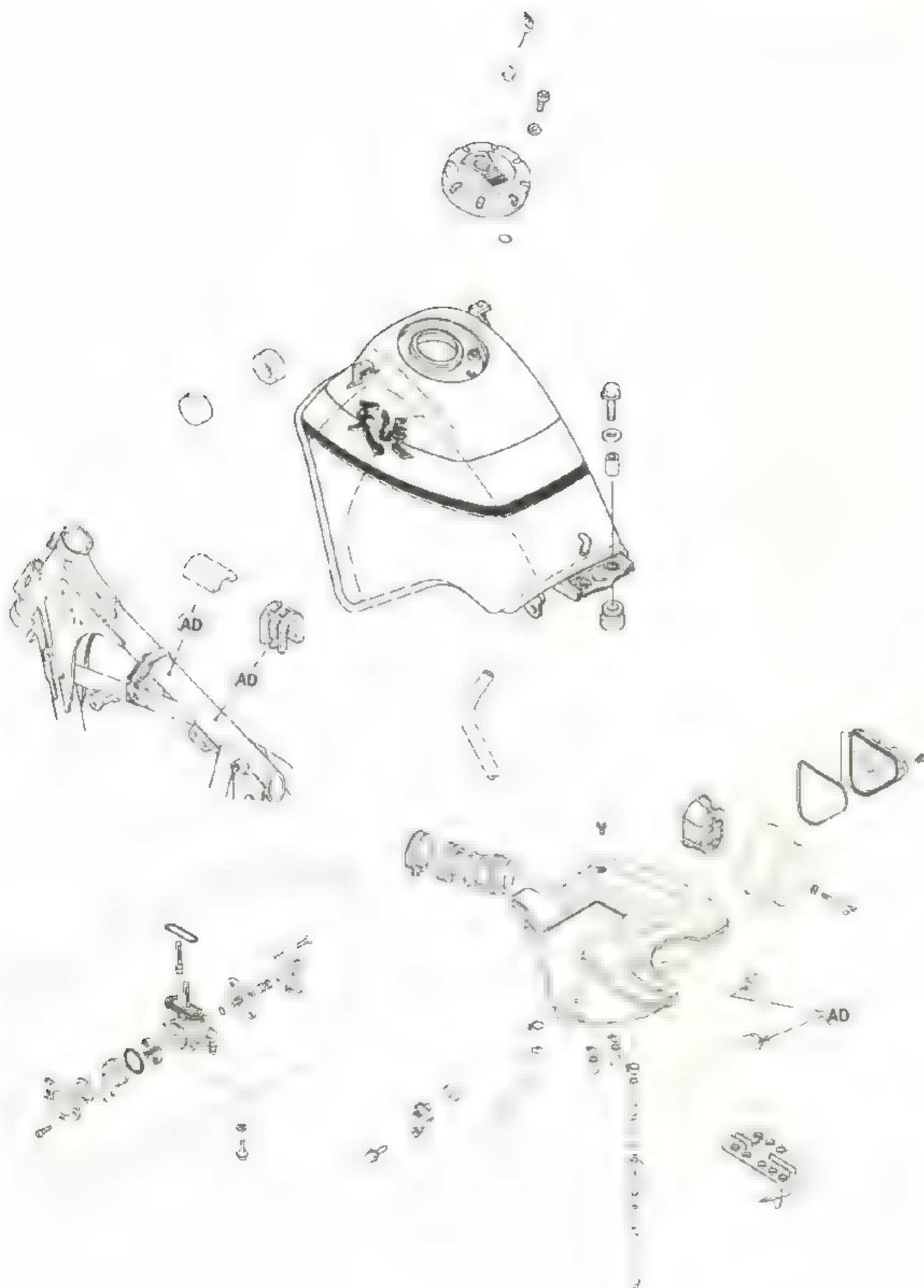
2-2 FUEL SYSTEM

Exploded View



- 1. Jet Needle
- 2. Pilot Screw
- 3. Pilot Jet
- 4. Needle Jet
- 5. Needle Jet Holder
- 6. Main Jet
- O : Apply oil.
- G : Apply grease.
- AD: Apply adhesive cement.





2-4 FUEL SYSTEM

Specifications

Item	KL650-B1	KL500-B1
Throttle Grip Free Play	2 ~ 3mm	←
Choke Cable Free Play	2 ~ 3mm	←
Idle Speed	1 300 ± 50 r/min (rpm)	←---
Carburetor Specifications:		
Make/type	Keihin/CVK40	←---
Main jet	#145, (S) #148	#148
Main air jet	#50	←---
Needle jet	#6	←---
Jet needle	N74C, (S) N60N	N54G
Pilot jet	#40	←---
Pilot air jet	#70	←---
Pilot screw	1½, (S) 1½ (turns out)	1½ (turns out)
Starter jet	#52	←---
Service fuel level (above the bottom edge of the carburetor body)	0.5 ± 1 mm	←---
Float height	17.5 mm	←-
Air Cleaner:		
Air cleaner element oil:	SE class	←
Grade Viscosity	SAE 30	←---

(S) . Swiss Model

Special Tools

Pressure Cable Luber: K56019-021



Fuel Level Gauge: 57001 1017



Pilot Screw Adjuster: 57001-1240



Jack Stand: 57001 1238

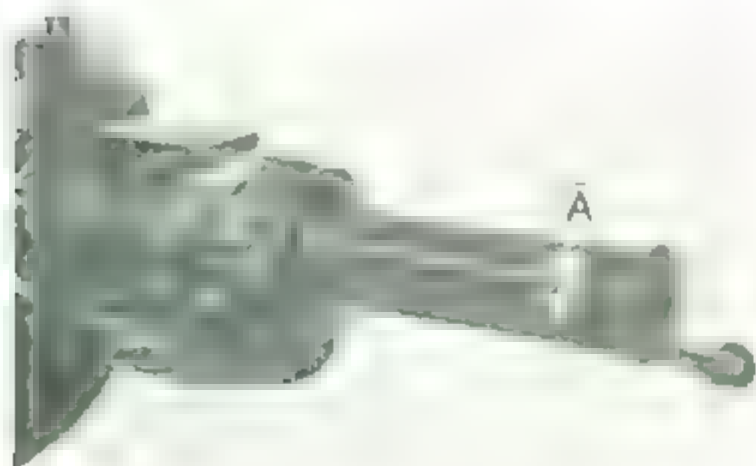


2-6 FUEL SYSTEM

Throttle Grip and Cables

Free Play Inspection

- Check the throttle grip free play



A Throttle Grip Free Play

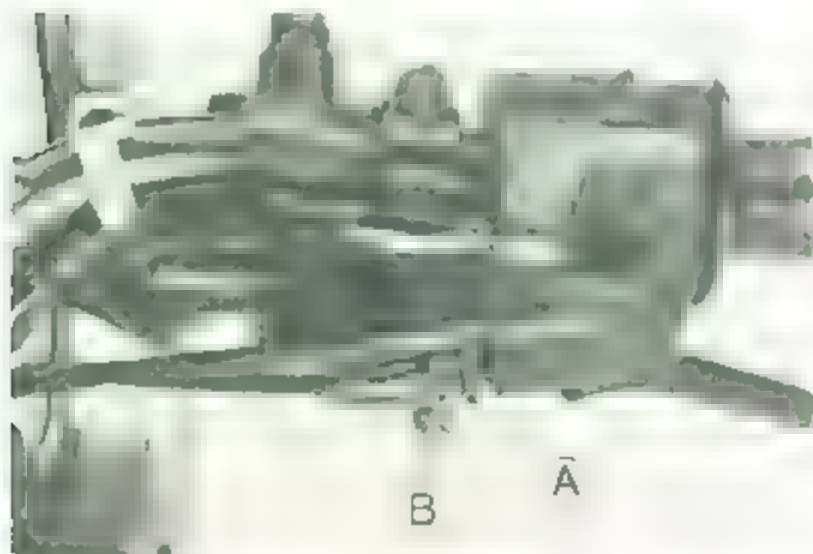
Throttle Grip Free Play

Standard: 2 ~ 3 mm

- ★ If the free play is incorrect, adjust the throttle cable

Free Play Adjustment

- Loosen the locknut
- Turn the adjuster until the proper amount of throttle grip free play can be obtained



A Locknut

B Adjuster

- Tighten the locknut securely
- ★ If the proper amount of free play can not be obtained by using the adjuster only, use the adjusting nut at the lower part of the accelerator cable, too
- Loosen the locknut, and screw the adjuster in fully at the upper end of the accelerator cable
- Tighten the locknut securely
- Remove the fuel tank (see Fuel Tank Removal)
- Loosen the locknut at the lower part of the accelerator cable

- Turn the adjusting nut until the proper amount of throttle grip free play is obtained



A Locknut

C Accelerator Cable

B Adjusting Nut

- Tighten the locknut securely
- ★ If the proper amount of free play can not be obtained in the adjustable range of the adjusting nut, use the adjuster screwed fully at the upper end of the accelerator cable again

Cable Installation Notes

- Install the throttle cables in accordance with the Cable Routing section in the General Information chapter
- Install the lower ends of the throttle cable in the cable bracket on the carburetor after installing the upper ends of the throttle cable in the grip.
- After the installation, adjust each cable properly

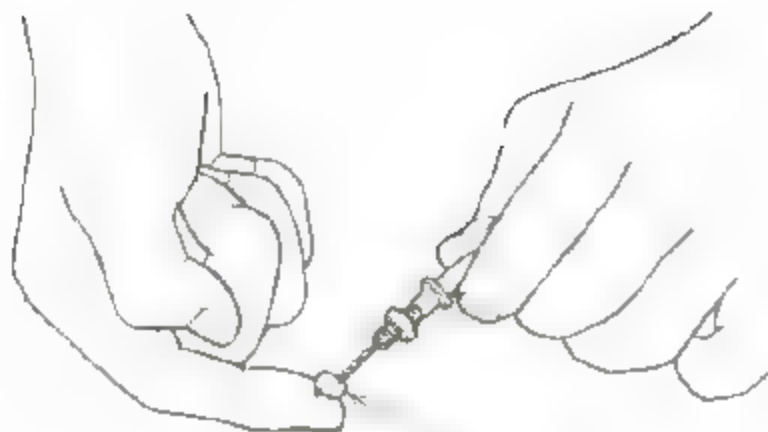
WARNING

- Operation with incorrectly routed or improperly adjusted cables could result in an unsafe riding condition

Cable Lubrication

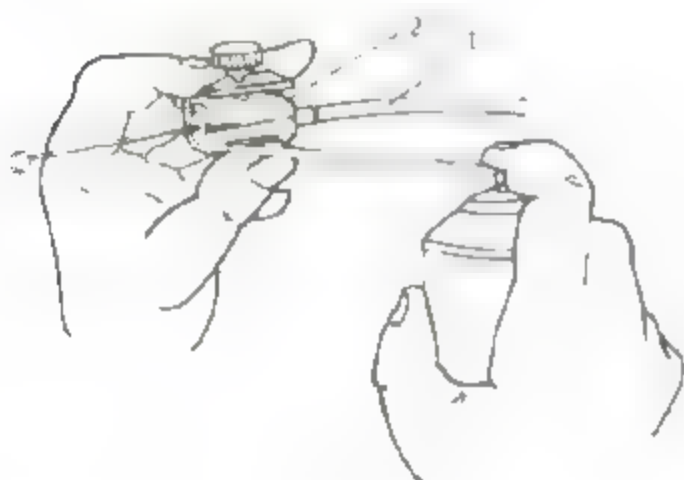
- Whenever the cable is removed, and in accordance with the Periodic Maintenance Chart (see General Information chapter), do the following
- Apply a thin coating of grease to the cable upper end.

★ If cable movement is not free after lubricating, if the cable is frayed, or if the housing is kinked, replace the cable.



1. Apply grease

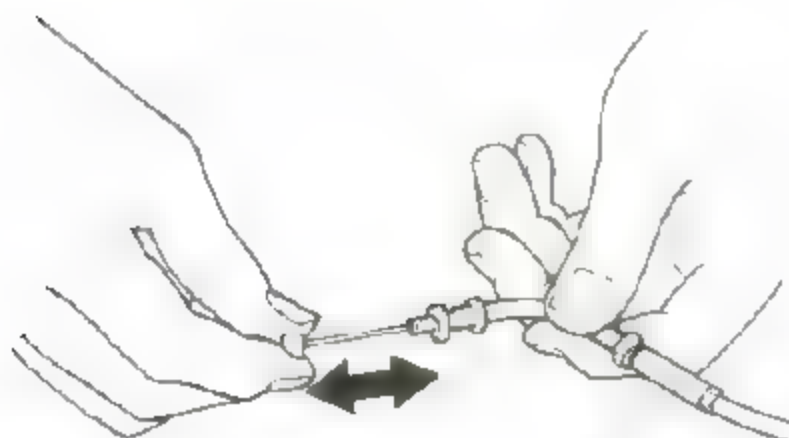
- Lubricate the cable with a penetrating rust inhibitor through the Pressure Cable Luber (special tool).



- 1 Cable
- 2 Pressure Cable Luber K56019-021

Cable Inspection

- With the throttle cable disconnected at both ends, the cable should move freely within the cable housing.



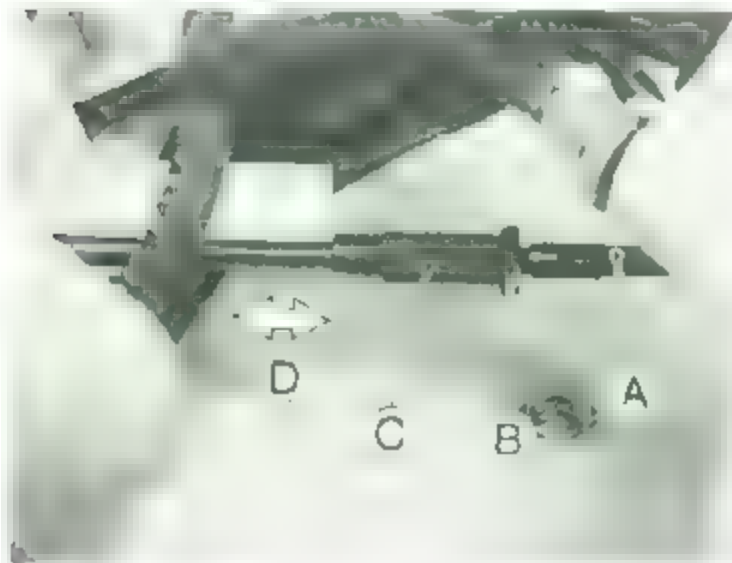
1. Cable

2-8 FUEL SYSTEM

Choke Cable

Free Play Inspection

- Check that the choke inner cable slides smoothly by moving the choke lever to the front and rear
- ★ If there is any irregularity, check the choke cable play
- Push the choke lever all the way to the front
- Determine the amount of choke cable play at the adjuster of the choke cable. Pull out and push in the outer cable, the amount of cable travel is the amount of choke cable free play.



- A. Choke Cable
B. Locknut
C. Adjuster
D. Free Play

★ If the free play is not correct, adjust the choke cable.

Choke Cable Free Play

2 ~ 3 mm

Adjustment

- Loosen the locknut, and turn the adjuster until the cable has the proper amount of free play.
- Tighten the locknut securely

Installation Notes

- Install the choke cable in accordance with the Cable Routing section in the General Information chapter.
- After installation, adjust the cable properly

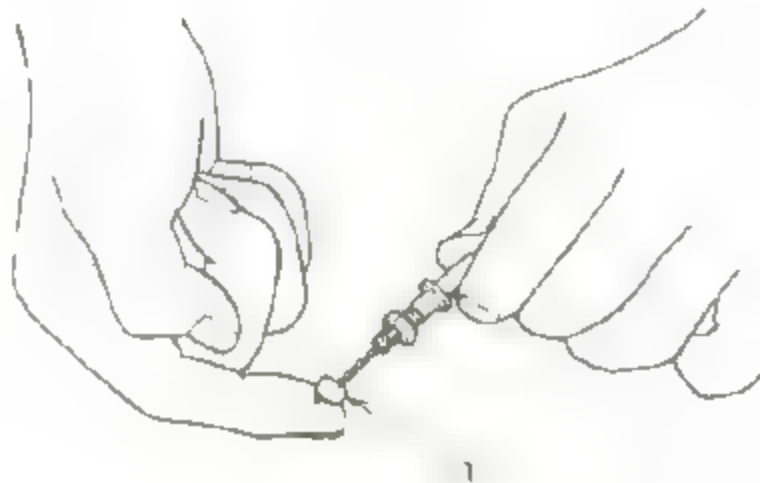
WARNING

○ Operation with incorrectly routed or improperly adjusted cable could result in an unsafe riding condition

Lubrication

Whenever the choke cable removed, lubricate the choke cable as follows

- After a thin coating of grease to the cable upper end



1. Apply grease.

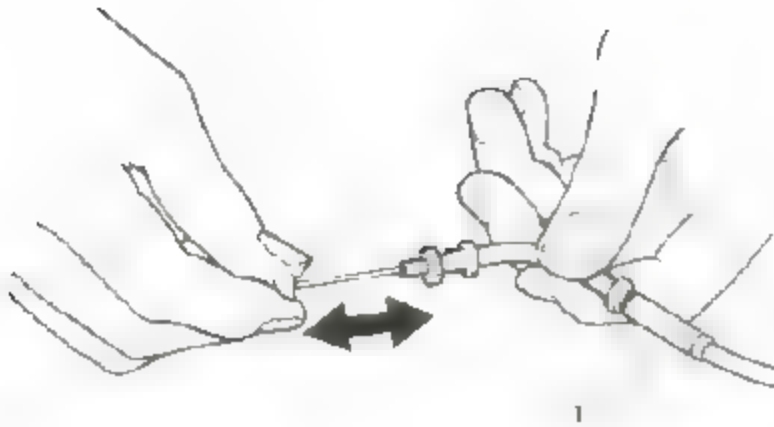
- Lubricate the cable with a penetrating rust inhibitor through the Pressure Cable Luber (special tool)



1. Cable
2. Pressure Cable Luber K56019-021

Inspection

- With the choke cable disconnected at the both ends, the cable should move freely within the cable housing



1 Choke Cable

★ If cable movement is not free after lubricating, if the cable is frayed, or if the housing is kinked, replace the cable.

Carburetor

Idle Speed Inspection

- Start the engine and warm it up thoroughly.
- With the engine idling, turn the handlebar to both sides.
- ★ If handlebar movement changes the idle speed, the throttle cable may be improperly adjusted or incorrectly routed, or it may be damaged. Be sure to correct any of these conditions before riding (see Cable Routing in the General Information chapter).

WARNING

ⓘ Operation with improperly adjusted, incorrectly routed, or a damaged cable could result in an unsafe riding condition.

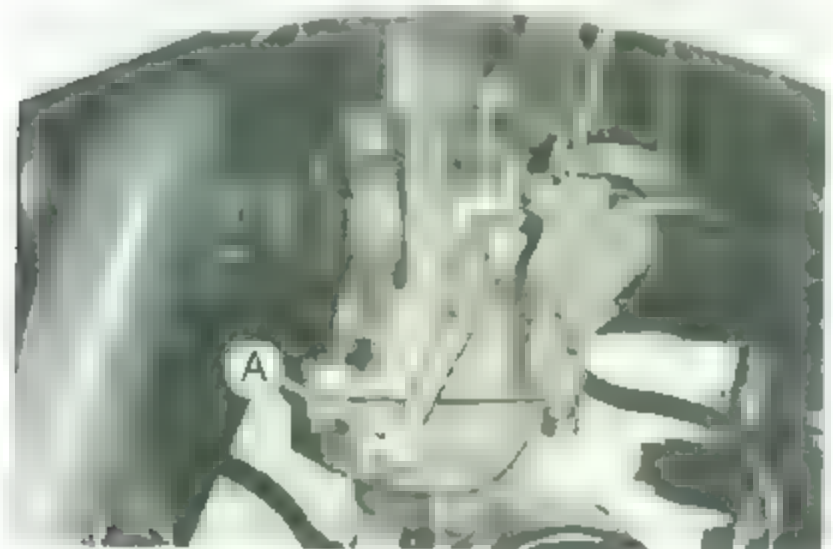
- Check idle speed.
- ★ If the idle speed is out of the specified range, adjust it.

Idle Speed

1 300 ± 50 r/min (rpm)

Idle Speed Adjustment

- Start the engine and warm it up thoroughly.
- Turn the adjusting screw until the idle speed is correct.



A. Idle Adjusting Screw

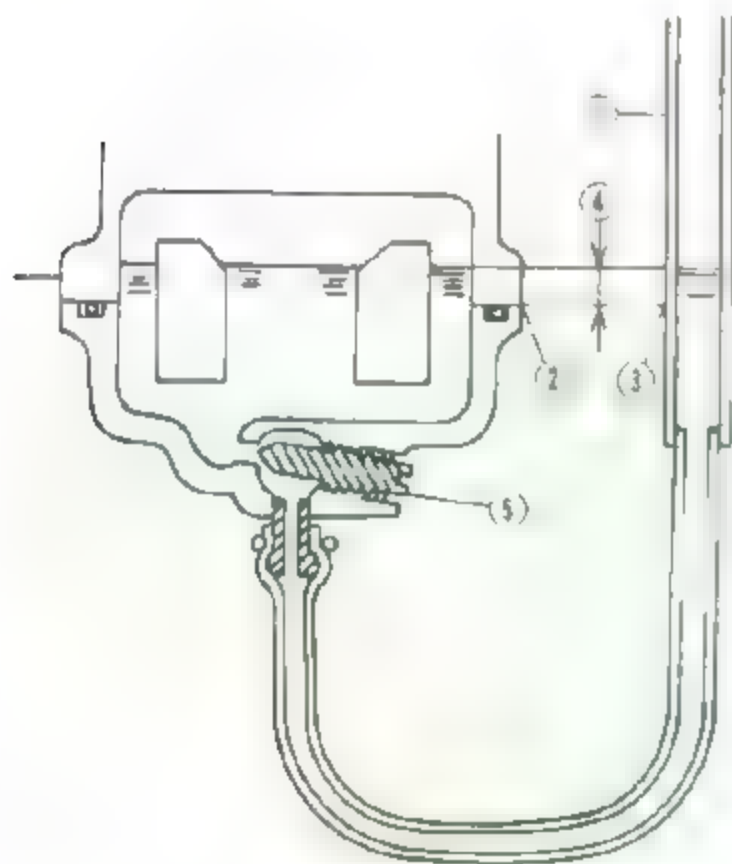
- Open and close the throttle a few times to make sure that the idle speed is within the specified range. Readjust if necessary.

2-10 FUEL SYSTEM

Service Fuel Level Inspection

WARNING

- Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks, this includes any appliance with a pilot light.
- Remove the carburetor, and hold them upright on a stand (see Carburetor Removal)
- Prepare an auxiliary fuel tank and connect the fuel hose to the carburetor
- Prepare a fuel hose (6 mm in diameter and about 300 mm long)
- Connect a fuel level gauge (special tool) to the carburetor float bowl with the fuel hose.
- Hold the gauge vertically against the side of the carburetor body so that the "zero" line is several millimeters higher than the bottom edge of the carburetor body
- Feed fuel to the carburetor, then turn out the carburetor drain plug a few turns.
- Wait until the fuel level in the gauge settles
- Keeping the gauge vertical, slowly lower the gauge until the "zero" line is even with the bottom edge of the carburetor body



1. Fuel Level Gauge: 57001-1017
2. Carburetor Body Bottom Edge
3. Zero Line
4. Fuel Level
5. Drain plug

NOTE

○ Do not lower the "zero" line below the bottom edge of the carburetor body. If the gauge is lowered and then raised again, the fuel level measured shows somewhat higher than the actual fuel level. If the gauge is lowered too far, dump the fuel out of it into suitable container and start the procedure over again.

- Read the fuel level in the gauge compare it to the specification. Screw in the carburetor drain plug
- Stop feeding and remove the fuel level gauge.
- ★ If the fuel level is incorrect, adjust it (see Service Fuel Level Adjustment)

Service Fuel Level

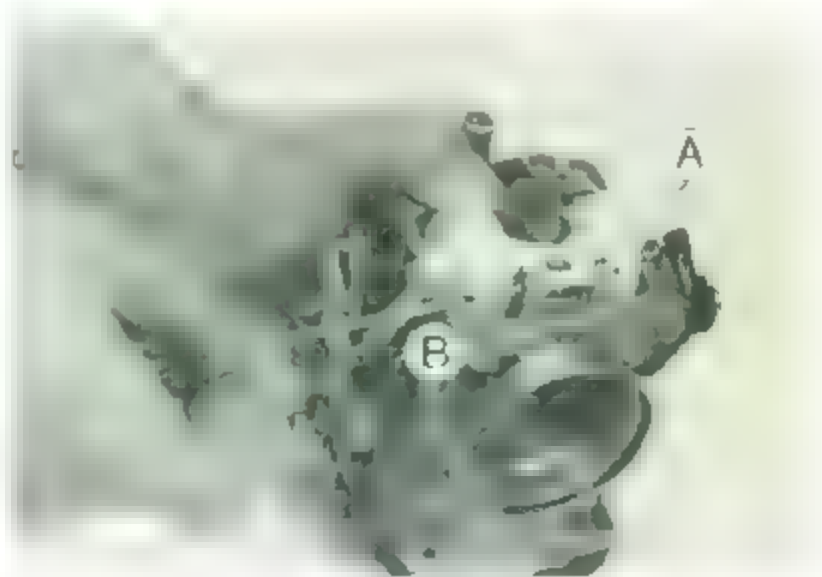
(above the bottom edge of the carburetor body)
 $0.5 \pm 1 \text{ mm}$

Service Fuel Level Adjustment

WARNING

○ Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks, this includes any appliance with a pilot light.

- Remove the carburetor and drain the fuel into a suitable container
- Remove the float bowl
- Drive out the pivot pin and remove the float



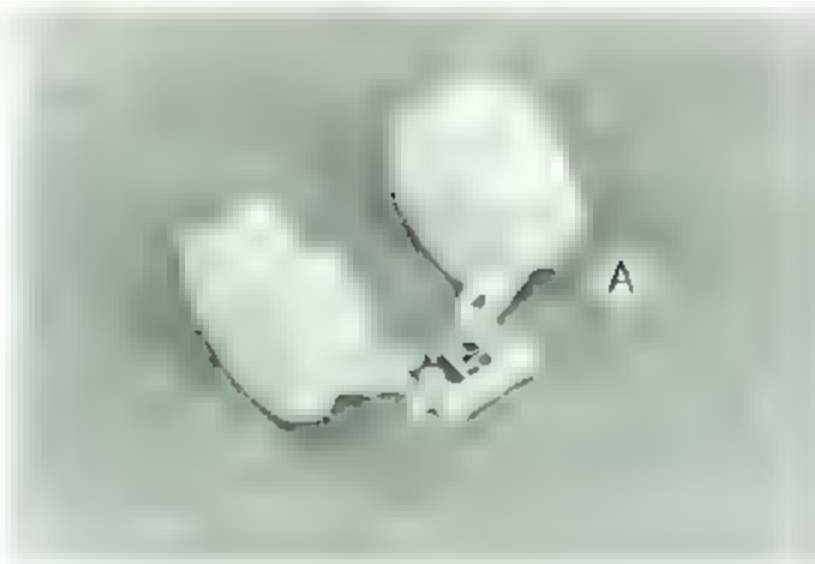
A. Pivot Pin

B. Drive out the pin.

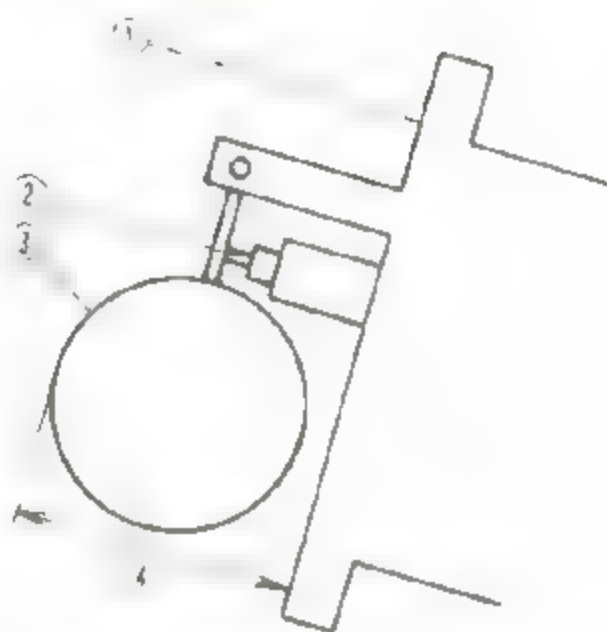
- Bend the tang on the float arm very slightly to change the float height. Increasing the float height lowers the fuel level and decreasing the float height raises the fuel level.

Float Height

17.5 mm



A Tang



- 1 Float Bowl Mating Surface
- 2 Float Valve Needle Rod
- 3 Float
- 4 Float Height

NOTE

○ Do not push the needle rod in during the float height measurement.

- Assemble the carburetor, and recheck the fuel level.
- ★ If the fuel level cannot be adjusted by this method, the float or the float valve is damaged.

Fuel System Cleanliness Inspection

WARNING

- Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Put the lower end of the overflow tube from the float bowl into a suitable container.
- Turn out the drain screw a few turns to drain some fuel from the carburetor, and check for water or dirt in the fuel.



A Drain Screw

- ★ If any water or dirt comes out, clean the carburetor, fuel tap and fuel tank (see Fuel Tank).
- Tighten the drain screw securely, and turn the fuel tap to the OFF position.

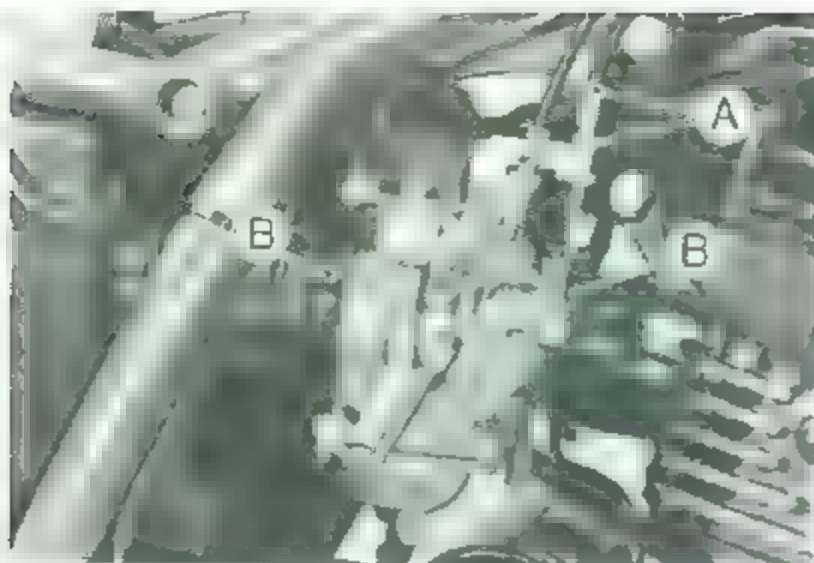
Removal

WARNING

- Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Remove the fuel tank (see Fuel Tank Removal).
- Run the overflow tube into a suitable container.
- Drain the fuel from the carburetor by turning out the drain screw a few turns.
- Remove the throttle cable lower ends.
- Loosen the clamps, and remove the carburetor from the end of the air cleaner duct to the right side and then pull it out of the carburetor holder with the fuel hose, fuel tap, vacuum hose, overflow tube and air vent hose attached.

2-12 FUEL SYSTEM



A. Throttle Cables B. Clamp

- Unscrew the guide holder at the choke cable lower end, and pull out the starter plunger assembly



A. Guide Holder B. Starter Plunger

CAUTION

- If the starter plunger is not removed from the cable, wrap it in a clean cloth to avoid damage

- Pull the hoses and tube off the carburetor
- After removing the carburetor, stuff pieces of lint free, clean cloth into the carburetor holder and the air cleaner duct to keep dirt out of the engine and air cleaner

WARNING

- If dirt or dust is allowed to pass through into the carburetor, the throttle may become stuck, possibly causing an accident.

CAUTION

- If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur

Installation Notes

- When installing the carburetor into the carburetor holder, fit the ridge into the notch.



A. Ridge B. Notch

- Route the air vent hose and overflow tube through the rubber clamp on the breather hose (see Hose Routing in the General Information chapter)

CAUTION

- Always keep the tubes free of obstruction and make sure they do not get pinched by the chain or shock absorber

- Adjust
 - Throttle Grip Free Play
 - Choke Cable Free Play
 - Idle Speed

Disassembly/Assembly Notes

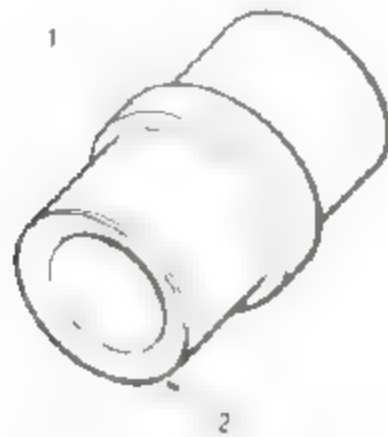
WARNING

- Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

CAUTION

- During carburetor disassembly, be careful not to damage the diaphragm. Never use a sharp edge to remove the diaphragm
- Turn in the pilot screw and count the number of turns until it seats fully but not tightly, and then remove the screw. This is to set the screw to its original position when assembling
- Turn in the pilot screw fully but not tightly, and then back it out the same number of turns counted during disassembly

- Turn the carburetor body upside down, and drop the needle jet into place so that the smaller diameter end of the jet goes in first.

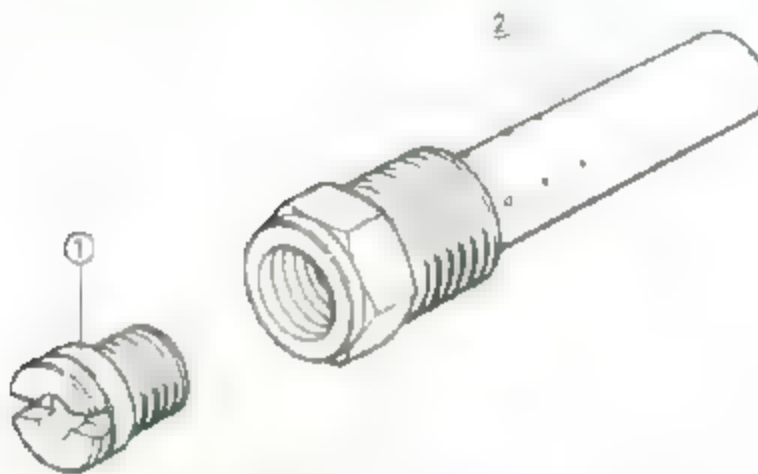


1 Needle Jet

2 Smaller Diameter End

CAUTION

- Do not force the needle jet holder (air bleed pipe) and main jet or overtighten them. They could be damaged requiring replacement.



1. Main Jet

2 Needle Jet Holder

Cleaning

WARNING

- Clean the carburetors in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area; this includes any appliance with a pilot light. Because of the danger of highly flammable liquids, do not use gasoline or low flash point solvents to clean the carburetors.

CAUTION

- Do not use compressed air on an assembled carburetor or the floats may be crushed by the pressure and the vacuum piston diaphragms may be damaged.
- Remove as many rubber or plastic parts from the carburetor as possible before cleaning the carburetor with a cleaning solution. This will prevent damage or deterioration of the parts.
- The carburetor body has plastic parts that cannot be removed. Do not use a strong carburetor cleaning solution which could attack these parts; instead, use a mild high flash point cleaning solution safe for plastic parts.
- Do not use wire or any other hard instrument to clean carburetor parts, especially jets, as they may be damaged.

- Disassemble the carburetor
- Immerse all the metal parts in a carburetor cleaning solution
- Rinse the parts in water
- When the parts are clean, dry them with compressed air
- Blow through the air and fuel passages with compressed air
- Assemble the carburetor

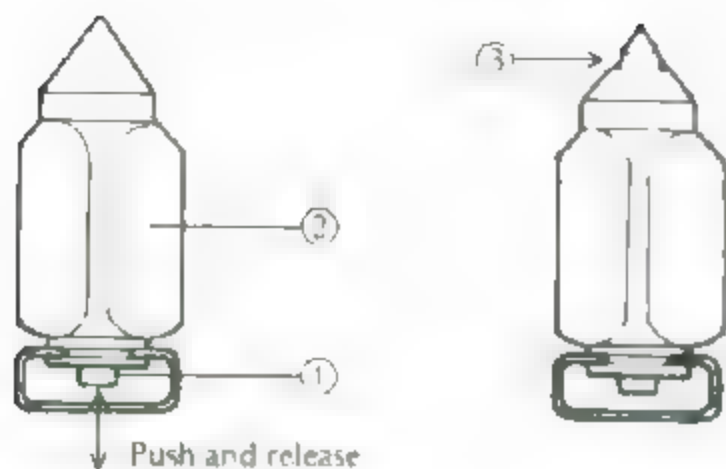
Inspection

WARNING

- Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Turn the throttle cable pulley to check that the throttle butterfly valve moves smoothly and return by spring tension
- ★ If the throttle valve does not move smoothly, replace the carburetor
- Check that the O-rings on the float bowl and drain plug and the diaphragm on the vacuum piston are in good condition
- ★ If any of the O-rings or diaphragms are not in good condition, replace them
- Check the plastic tip of the float valve needle. It should be smooth, without any grooves, scratches, or tears.

2-14 FUEL SYSTEM



- 1 Rod
2 Valve Needle

- 3 Valve Needle Wear

- ★ If the plastic tip is damaged, replace the needle
- Check the tapered portion of the pilot screw for wear or damage



- 1 Pilot Screw

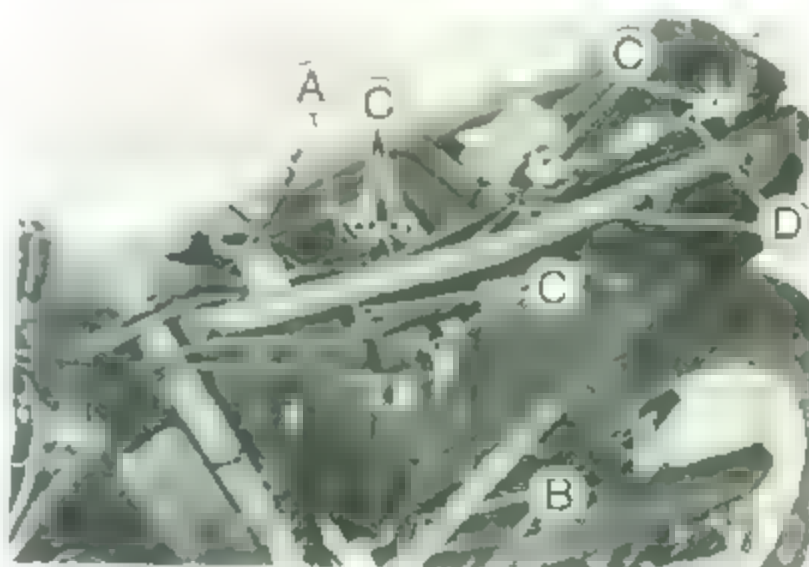
- 2 Tapered Port on

- ★ If the pilot screw is worn or damaged on the tapered portion, it will prevent the engine from idling smoothly. Replace it.

Air Cleaner

Housing Removal

- Remove the lower fairing, and set the jack stand (special tool: 57001 1238) under the frame
- Remove
 - Upper Faring
 - Seat Covers
 - Seat
 - Fuel Tank
 - Muffler
 - Fuse Box
 - Battery
 - Main Harness Connectors and Clamp



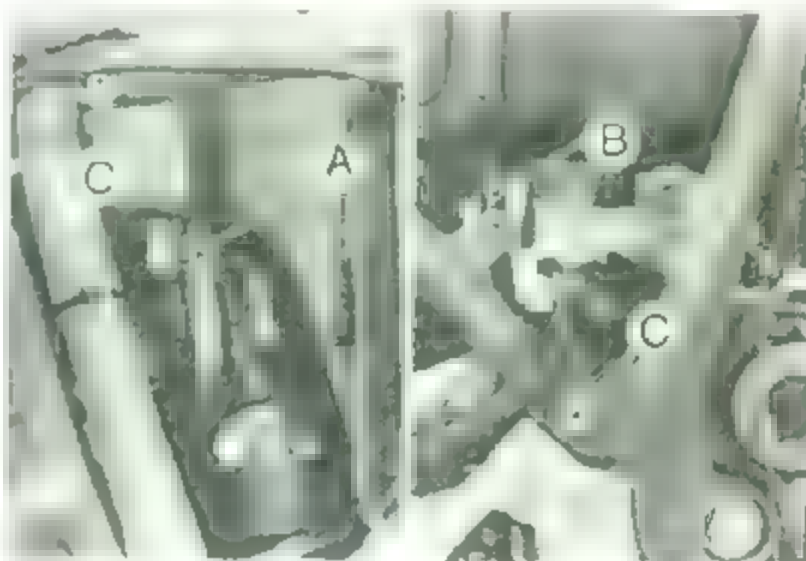
- A Fuse Box

- B. Battery Cover Screw

- C. Connectors

- D. Clamp

- Pull the air cleaner duct out of the carburetor
- Pull the engine breather hose upper end off the housing.
- Pull the drain hose off the housing

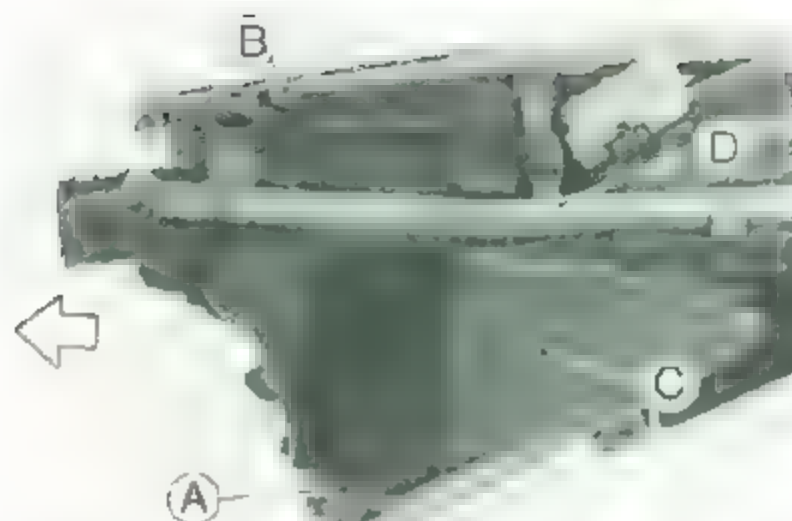


- A. Engine Breather Hose Upper End

- B. Drain Hose

- C. Rear Frame Mounting Bolts

- Remove the rear frame mounting bolts, and take off the rear frame assembly.
- Remove the mounting boss and mounting bolt, and take the housing out of the rear frame assembly



A. Mounting Boss
B. Mounting Bolt

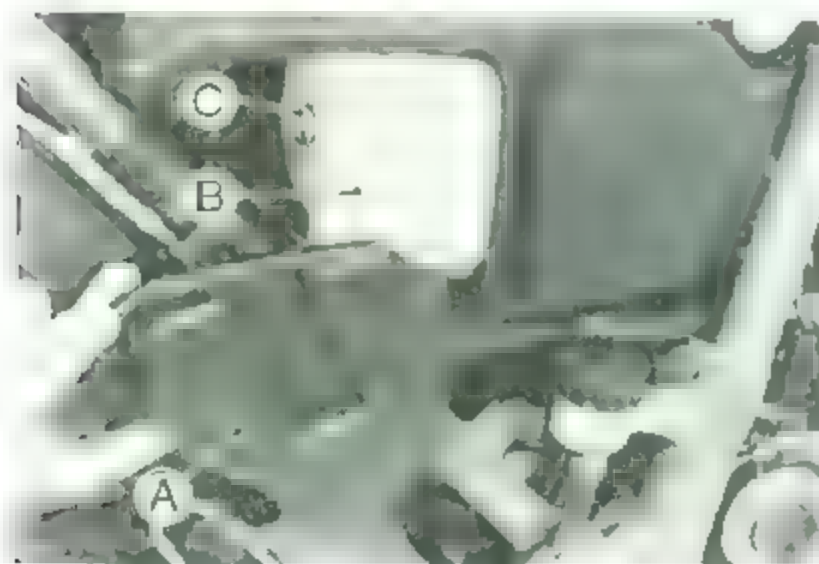
C. Air Cleaner Housing
D. Rear Frame Assembly

Housing Installation Notes

- Route harness/lead and hose/tube in accordance with the Wire/Hose Routing in the General Information chapter
- Tighten the following to the specified torque (see Exploded View in the Frame chapter)
 - Rear Frame Upper Mounting Bolts
 - Rear Frame Lower Mounting Bolts

Element Removal

- Remove the right side cover
- Take off the air cleaner element cap



A. Element Cap
B. Element

C. Wing Head Bolt

- Remove the wing head bolt and take off the air cleaner element.

Element Installation Notes

- Coat the element lip with a layer of all purpose grease to assure a complete seal against the cleaner case
- Be sure the foam gasket is in place in the groove in the element cap



A. Foam Gasket

Element Cleaning and Inspection

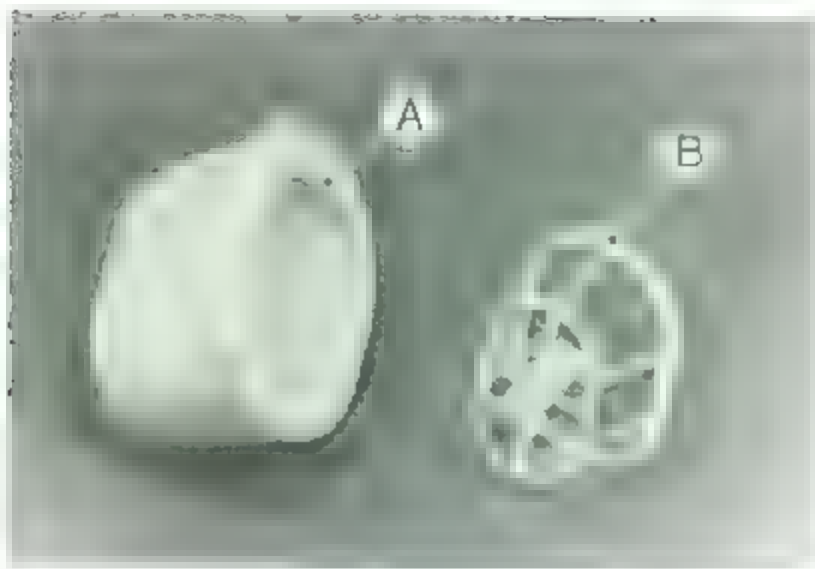
NOTE

- In dusty areas, the element should be cleaned more frequently than the recommended interval
- After riding through rain or on muddy roads, the element should be cleaned immediately
- Since repeated cleaning opens the pores of the element, replace it with a new one in accordance with the Periodic Maintenance Chart. Also, if there is a break in the element material or any other damage to the element, replace the element with a new one

WARNING

- Clean the element in a well ventilated area, and take ample care that there are no sparks or flame anywhere near the working area.
- Because of the danger of highly flammable liquids, do not use gasoline or a low flash point solvent to clean the element
- Remove the air cleaner element, and separate the element from the element frame

2-16 FUEL SYSTEM



A. Filter

B. Frame

WARNING

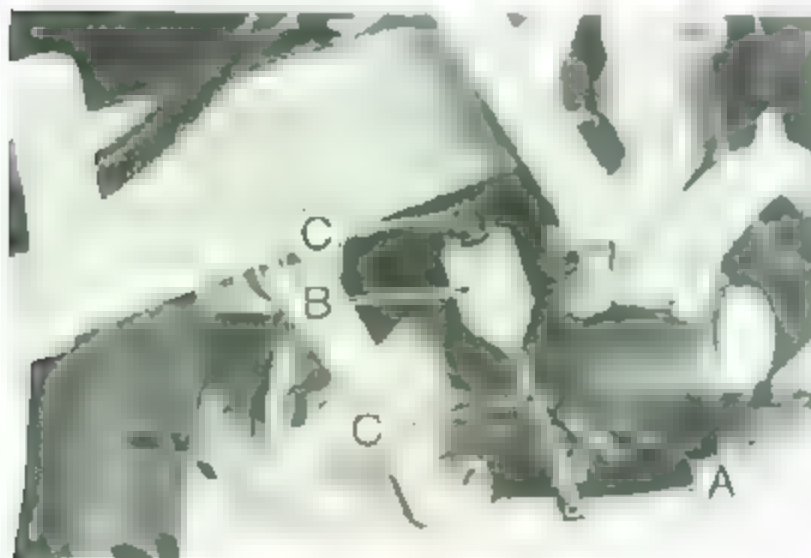
- Be sure to install the plug in the drain hose after draining. Oil on tires will make them slippery and can cause an accident and injury.

- Clean the element in a bath of a high flash-point solvent and then dry it with compressed air or by shaking it.
- Check all the parts of the element for visible damage.
- ★ If any of the parts of the element are damaged, replace them.
- After cleaning, saturate the sponge filter with SE class SAE 30 oil, squeeze out the excess, then wrap it in a clean rag and squeeze it dry as possible. Be careful not to tear the sponge filter.
- Assemble the element, and install it.

Oil Draining

A drain hose is connected to the bottom of the air cleaner housing to drain oil accumulated at the bottom of the housing.

- Visually check the translucent catch tank at the middle of the drain hose if the oil accumulates in the reservoir.
- ★ If any oil accumulates in the catch tank, drain it by taking off the plug at the lower end of the drain hose.



A. Plug

B. Catch Tank

C. Drain Hose

Fuel Tank

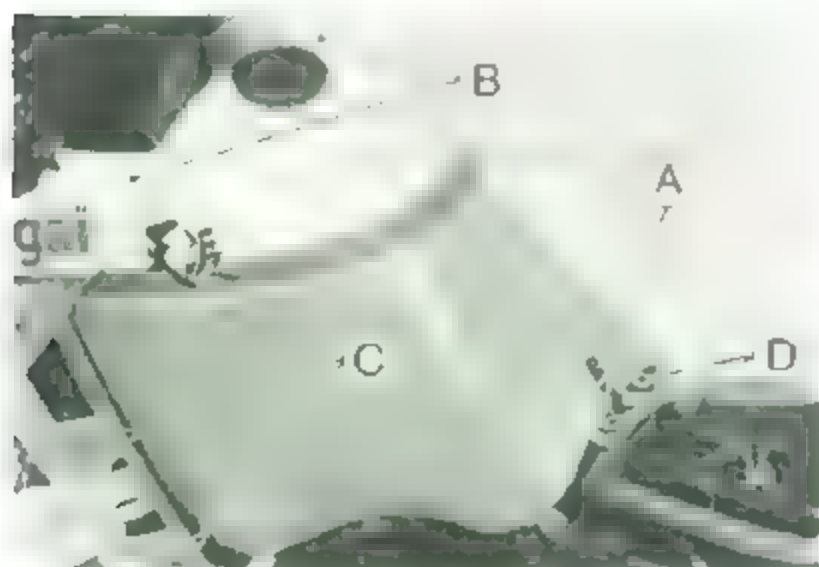
Removal

- Remove
 - Side Covers
 - Seat
- Turn the fuel tap to the OFF position
- Pull the fuel hose and the fuel tap vacuum hose off the fuel tap
- Pull the breather hose off the fuel tank

WARNING

- Gasoline is extremely flammable and can be explosive under certain conditions. Turn the engine stop switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light

- Remove the upper fairing mounting screws, and pull the upper fairing mounting bosses off the fuel tank
- Remove the fuel tank mounting bolts, and take off the tank



A Breather Hose C Mounting Bosses
B Mounting Screws D Mounting Bolts

Installation Notes

- Check the rubber dampers



A Rubber Dampers

- ★ If the dampers are damaged or deteriorated, replace them
- Be sure the fuel hose is clamped to the fuel tap to prevent leak

Inspection

- Visually inspect the gasket on the tank cap for any damage
- ★ Replace the gasket if it is damaged
- Remove the hose(s) from the fuel tank, and open the tank cap
- Check to see if the breather and water drain pipes in the tank are not clogged. Check the tank cap breather too.
- ★ If the tank pipes are clogged, remove the tank and drain it and then blow the pipes free with compressed air.
- ★ If the tank cap breather is clogged, replace it.

CAUTION

- Do not apply compressed air to the air vent holes on the tank cap. This could cause damage and clogging of the labyrinth in the cap



A Air Vent Holes

2-18 FUEL SYSTEM

Cleaning

- Remove the fuel tank and drain it.
- Pour some high flash point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.

WARNING

○ Clean the tank in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flash point solvents to clean the tank.

- Pour the solvent out of the tank.
- Remove the fuel tap from the tank by taking out the bolts with nylon washers.
- Clean the fuel tap filter screens in a high flash-point solvent.
- Pour high flash point solvent through the tap in all lever positions.
- Dry the tank and tap with compressed air.
- Install the tap in the tank.
- Install the fuel tank.

Fuel Tap Removal

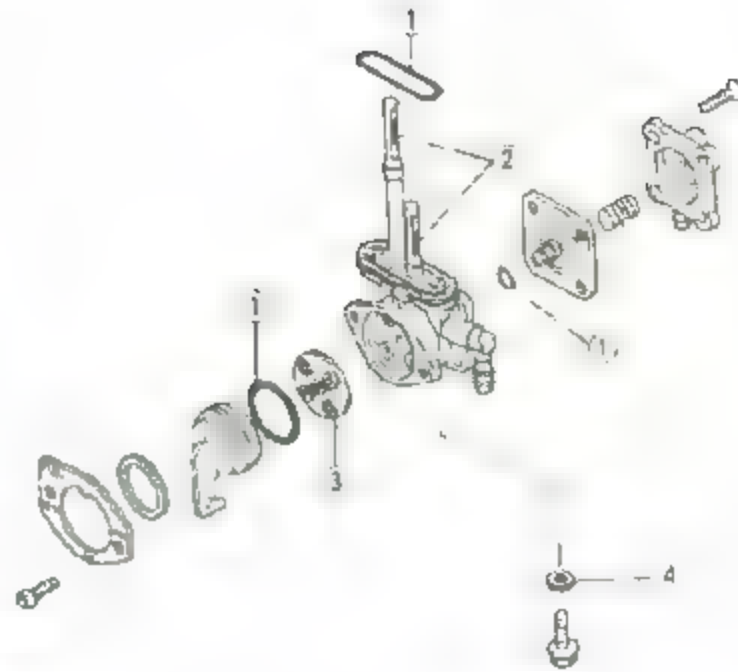
- Remove the fuel tank and drain it.
- Remove the bolts with nylon flat washers and take out the fuel tap.

Fuel Tap Installation Notes

- Be sure the O-ring is in good condition to prevent leaks.
- Be sure to clamp the fuel hose to the tap to prevent leaks.
- Be sure the nylon washers are in good condition to prevent leaks.
- Do not use steel washers in place of the nylon washers, because they will not seal the bolts properly and fuel will leak.

Fuel Tap Inspection

- Remove the fuel tap.
- Check the fuel tap filter screens for any breaks or deterioration.



- 1. O ring
- 2. Filter Screens
- 3. Gasket
- 4. Nylon Washer

- ★ If the fuel tap screens have any breaks or are deteriorated, it may allow dirt to reach the carburetor, causing poor running. Replace the fuel tap.
- ★ If the fuel tap leaks, or allows fuel to flow when it is at ON or RES position without engine running, replace the damaged gasket or O-ring.
- ★ If the fuel tap leaks, or allows fuel to flow when it is at OFF position with or without engine running, replace the damaged gasket or O-ring.

Cooling System

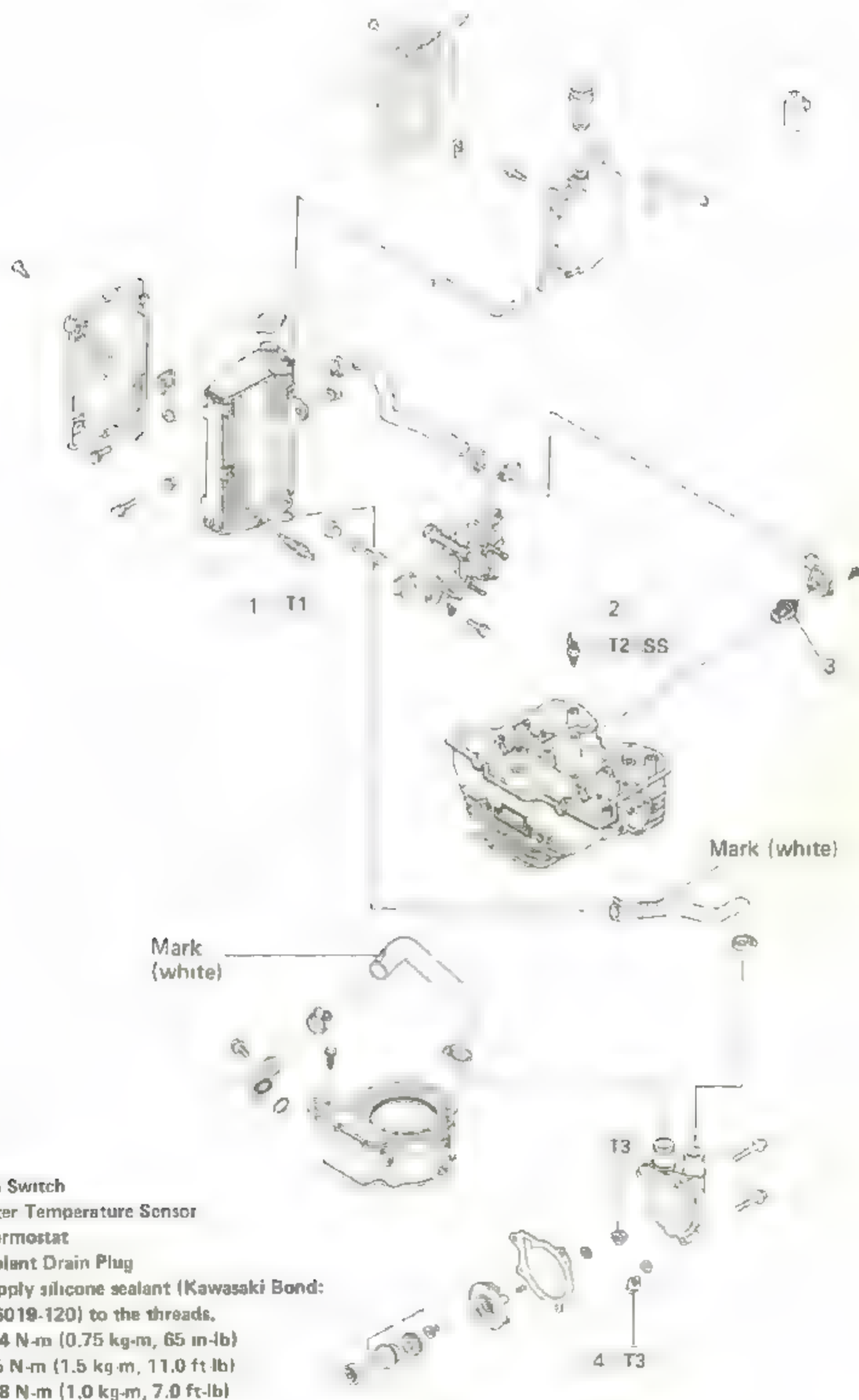
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3-2 COOLING SYSTEM

Exploded View



1. Fan Switch

2. Water Temperature Sensor

3. Thermostat

4. Coolant Drain Plug

SS: Apply silicone sealant (Kawasaki Bond: 56019-120) to the threads.

T1: 7.4 N-m (0.75 kg-m, 65 in-lb)

T2: 15 N-m (1.5 kg-m, 11.0 ft-lb)

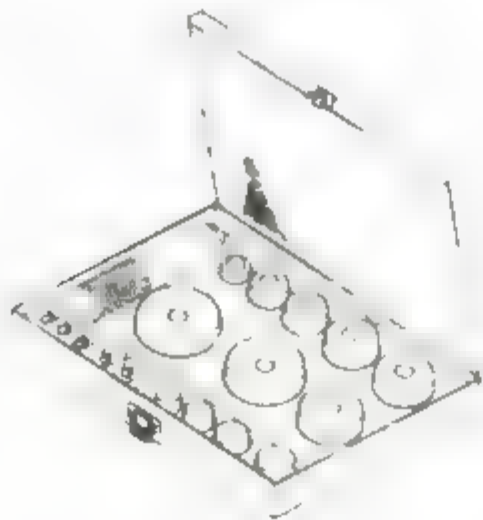
T3: 9.8 N-m (1.0 kg-m, 7.0 ft-lb)

Specifications

Items	Standard
Coolant: Type Color Mixed ratio Freezing point Total amount	Permanent type of antifreeze for aluminum engines and radiators Green Soft water 50%, coolant 50% -35°C (-31°F) 1.3 L (reservoir tank full level)
Radiator: Cap relief pressure	93 ~ 123 kPa (0.95 ~ 1.25 kg/cm ² , 14 ~ 18 psi)
Thermostat: Valve opening temperature Valve full opening lift	69.5 ~ 72.5 $^{\circ}\text{C}$ (157 ~ 162 $^{\circ}\text{F}$) Not less than 3mm @85 $^{\circ}\text{C}$ (185 $^{\circ}\text{F}$)

Special Tool

Bearing Driver Set 57001-1129



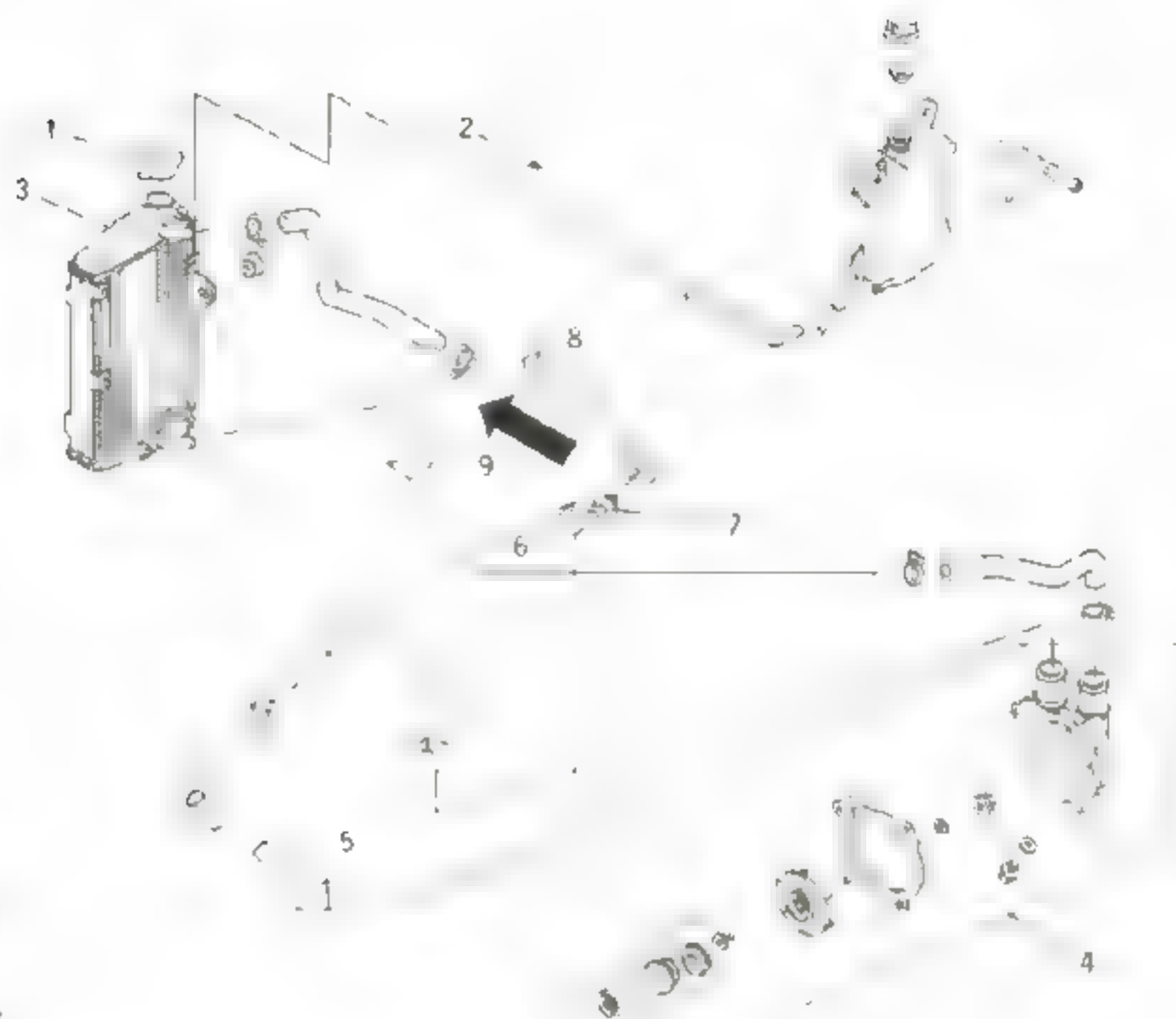
Sealant

Kawasaki Bond (Silicone Sealant) 56019-120



3-4 COOLING SYSTEM

Cooling System



1. Radiator Cap
2. To Reservoir Tank
3. Radiator
4. Water Pump
5. To Cylinder Jacket
6. From Cylinder Head
7. Thermostat
8. Through Thermostat Air Bleeder Hole
9. Through Thermostat Valve

Coolant

Check the coolant level each day before riding the motorcycle, and replenish coolant if the level is low. Change the coolant in accordance with the Periodic Maintenance Chart (see the General Information chapter).

Inspection

Deterioration:

- Visually inspect the coolant in the reservoir tank.

NOTE

- Be sure to inspect the coolant at the reservoir tank. If the coolant is checked at the radiator by removing the radiator cap, the air must be bled from the cooling system.
- If whitish cotton-like wafts are observed, aluminum parts in the cooling system are corroded. If the coolant is brown, iron or steel parts are rusting. In either case, flush the cooling system.
- If the coolant gives off an abnormal smell, check for a cooling system leak. It may be caused by exhaust gas leaking into the cooling system.

Level

- Situate the motorcycle so that it is perpendicular to the ground.
- Check the level through the coolant level gauge on the reservoir tank. The coolant level should be between the FULL and LOW marks.

NOTE

- Check the level when the engine is cold (room or ambient temperature).
- Do not check the level through the radiator filler by removing the cap. If the cap is removed, air may get into the coolant, and lower the cooling efficiency.



A FULL Mark

B LOW Mark

- ★ If the amount of coolant is insufficient, add coolant through the filler opening to the FULL mark.

CAUTION

- For refilling, add the specified mixture of coolant and soft water. Adding water alone dilutes the coolant and degrades its anticorrosion properties. The diluted coolant can attack the aluminum engine parts. In an emergency, soft water can be added. But the diluted coolant must be returned to the correct mixture ratio within a few days.
- If coolant must be added often, or the reservoir tank has run completely dry, there is probably leakage in the cooling system. Check the system for leaks (see Visual Leak Inspection, and Cooling System Pressure Testing).

Change

The coolant should be changed periodically to ensure long engine life.

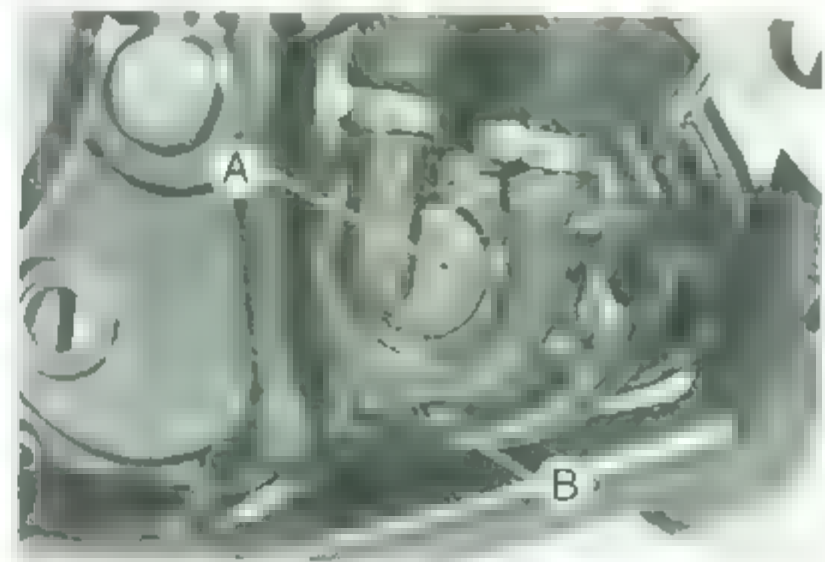
Draining

WARNING

- To avoid burns do not remove the radiator cap or try to change the coolant when the engine is still hot. Wait until it cools down.
- Coolant on tires will make them slippery and can cause an accident and injury. Immediately wipe up or wash away any coolant that spills on the frame, engine or other painted parts.
- Since coolant is harmful to the human body, do not use for drinking.
- Remove the lower fairing.
- Place a container under the water pump.
- Drain the coolant from the radiator and engine by removing the drain plug at the bottom of the water pump.

NOTE

- Position the motorcycle upright so that the coolant may be drained easily.



A Water Pump

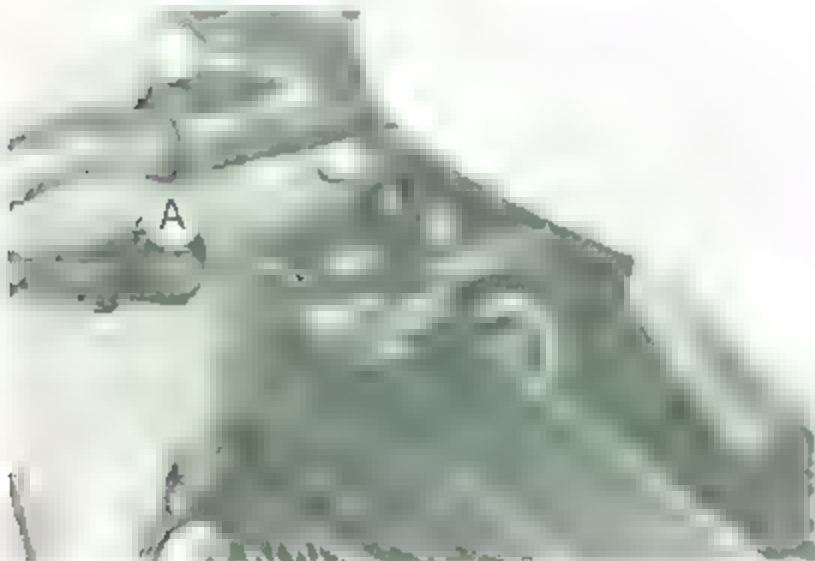
B Drain Plug

3-6 COOLING SYSTEM

- Remove the radiator cap for fast draining

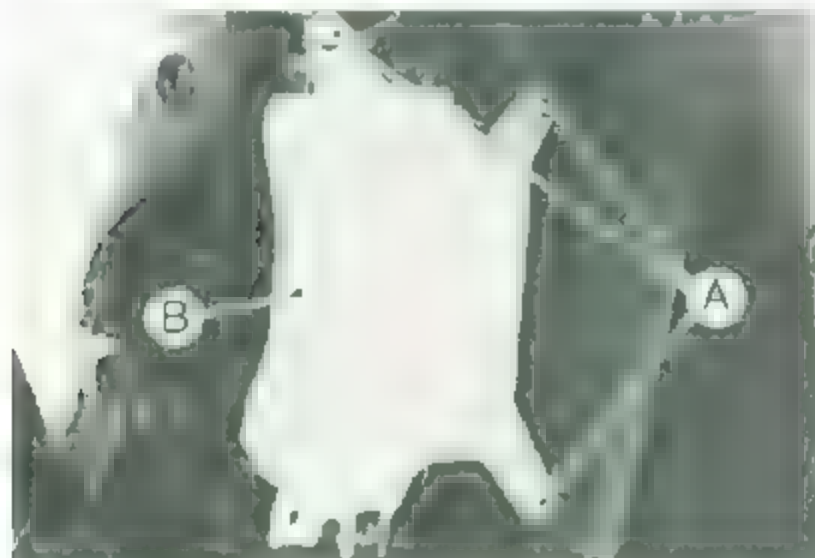
NOTE

- Remove the radiator cap in two steps. First turn the cap counterclockwise to the first stop and wait there for a few seconds. Then push and turn it further in the same direction and remove the cap



A Radiator Cap

- Remove the reservoir tank cover
- Pull off the air vent hose and remove the mounting bolts from the reservoir tank, and take out the tank with the reservoir tank hose attached



A. Mounting Bolts B Reservoir Tank

- Unscrew the cap and pour the coolant into a container
- Inspect the old coolant for visual evidence of corrosion and abnormal smell (see Coolant Deterioration).

Filling:

CAUTION

- Use coolant containing corrosion inhibitors made specifically for aluminum engines and radiators in accordance with the manufacturer's instructions.
- Soft or distilled water must be used with the antifreeze in the cooling system.

- If hard water is used in the system it causes scales accumulation in the water passages, and considerably reduces the efficiency of the cooling system

NOTE

- Choose a suitable mixture ratio by referring to the coolant manufacturer's directions

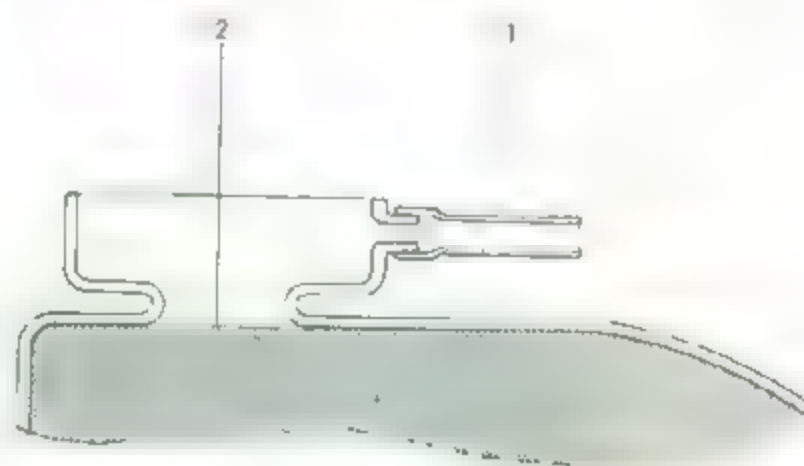
Coolant Provided When Shipping

Type	: Permanent type antifreeze for aluminum engines and radiators
Color	: Green
Mixed ratio	: Soft water 50%, coolant 50%
Freezing point	: -35°C (-31°F)
Total amount	: 1.3L (reservoir tank full level)

- Install the drain plug. Always replace the gasket with a new one, if it is damaged
- Tighten the drain plug to the specified torque (see Exploded View)
- Install the lower fairing
- Fill the radiator up to the bottom of the radiator filler neck with coolant and install the cap turning it clockwise about 1/4 turn

NOTE

- Pour in the coolant slowly so that it can expel the air from the engine and radiator
- The radiator cap must be installed in two steps. First turn the cap clockwise to the first stop. Then push down on it and turn it the rest of the way



1. Reservoir Tank Hose 2 Coolant Level

- Install the reservoir tank cover
- Fill the reservoir tank up to the FULL mark with coolant, and install the cap.

Air Bleeding

Before putting the motorcycle into operation, any air trapped in the cooling system must be removed as follows:

- Remove the radiator cap.
- Fill the radiator up to the radiator filler neck with coolant, and install the radiator cap.
- Check the cooling system for leaks.
- Start the engine, warm it up thoroughly, and then stop it.
- Check the coolant level in the reservoir tank after the engine cools down.
- ★ If the coolant level is low, add coolant up to the Full mark through the reservoir tank opening.

Visual Leak Inspection

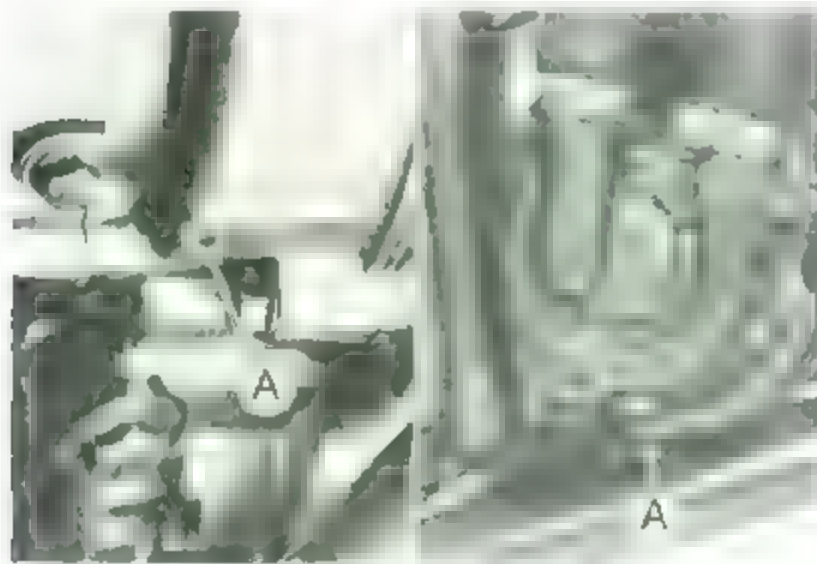
Any time the system slowly loses coolant, inspect for leaks.

- Visually check the water pump drainage outlet passage for coolant leaks.
- ★ If the mechanical seal is damaged, the coolant leaks through the seal and drains through the passage. Replace the mechanical seal as a unit with a new one.

CAUTION

○ Whenever the mechanical seal is replaced, the oil seal and the ball bearing must be replaced with new ones too.

- ★ If there are no apparent leaks, pressure test the cooling system.



A Drainage Outlet Passage at the bottom of water pump

Cooling System Pressure Testing

CAUTION

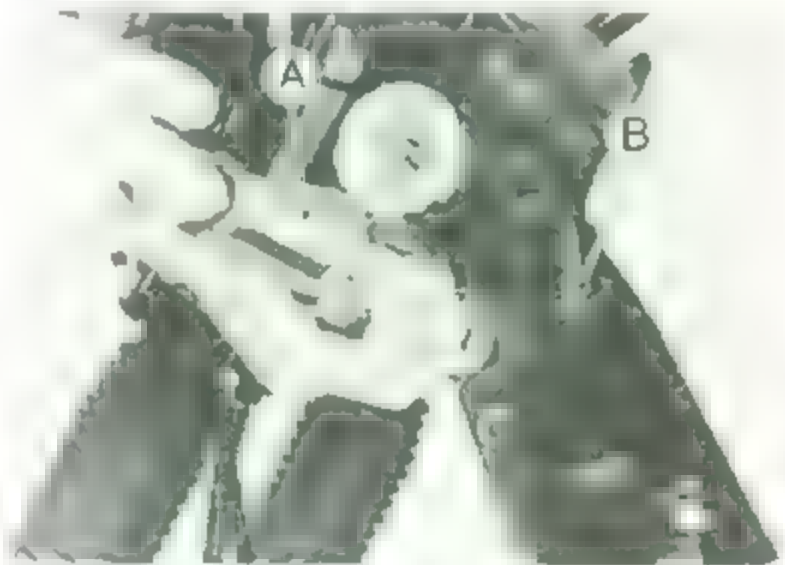
○ During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 123 kPa (1.25 kg/cm², 18 psi).

- Remove the radiator cap, and install a cooling system pressure tester on the radiator filler neck.

NOTE

○ Wet the adapter cap sealing surfaces with water or coolant to prevent pressure leaks.

- Build up pressure in the system carefully until the pressure reaches 123 kPa (1.25 kg/cm², 18 psi).
- Watch the gauge for at least 6 seconds. If the pressure holds steady, the cooling system is all right.



A Pressure Tester

B Adapter

- Remove the pressure tester, replenish the coolant, and install the radiator cap.

★ If the pressure drops and no external source is found, check for internal leaks. Check the cylinder head gasket for leaks.

3-8 COOLING SYSTEM

Cooling System Flushing

Over a period of time, the cooling system accumulates rust, scale, and lime in the water jacket and radiator. When this accumulation is suspected or observed, flush the cooling system. If this accumulation is not removed it will clog up the water passage and considerably reduce the efficiency of the cooling system.

- Drain the cooling system
- Fill the cooling system with fresh water mixed with a flushing compound

CAUTION

- Avoid the use of a flushing compound which is harmful to the aluminum engine and radiator. Carefully follow the instructions supplied by the manufacturer of the cleaning product

- Warm up the engine, and run it at normal operating temperature for about ten minutes
- Stop the engine, and drain the cooling system
- Fill the system with fresh water
- Warm up the engine and drain the system.
- Repeat the previous two steps once more
- Fill the system with a permanent type coolant, and bleed the air from the system (see Air Bleeding).

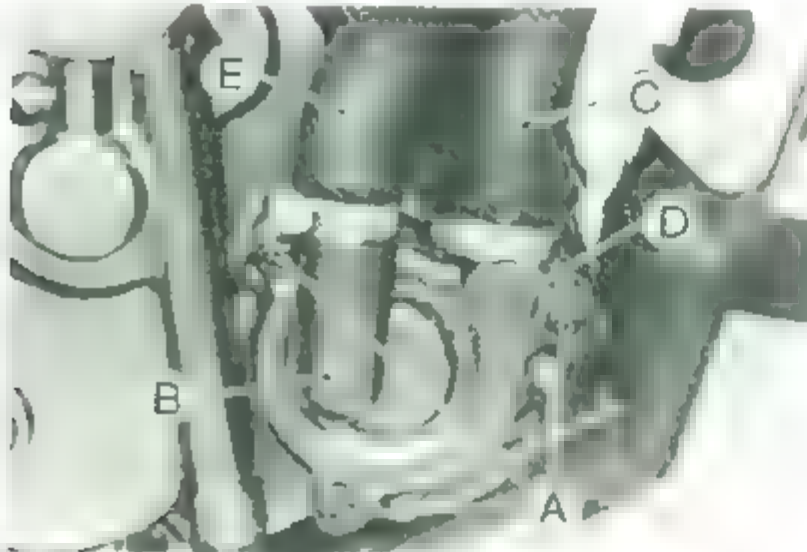
Disassembly and Assembly Precautions

- Prior to disassembly of cooling system parts (radiator, pump, sensors, etc), wait until the coolant cools down, and then drain the coolant.
- After assembling and filling the system with coolant bleed any air from the system

Water Pump

Cover Removal

- Drain the coolant (see Coolant Draining).
- Loosen the clamps, and pull the water pump hose and the radiator hose lower ends off the pump ports
- Remove the cover bolts and remove the water pump cover



- | | |
|---------------------|--------------------|
| A. Cover Bolts | D Arrow "CYL" Mark |
| B. Water Pump Cover | E Radiator Hose |
| C. Water Pump Hose | |

Cover Installation Notes

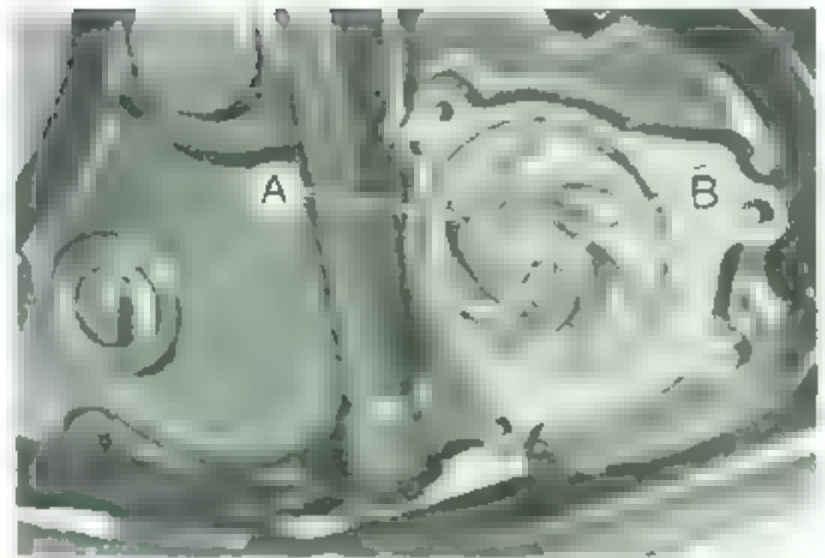
- Be careful not to mix up the water pump hose and the radiator hose when connecting them with the pump ports. For the water pump hose, the port has the arrow "CYL" mark
- Replace the pump cover gasket with a new one
- Tighten the hose clamp bolts so that they are positioned on the right as one faces the cover
- Fill the cooling system (see Coolant Filling)

Impeller Removal

- Drain the coolant (see Coolant Draining)
- Remove the cover bolts and turn up the water pump cover with the radiator hose attached
- Remove the impeller nut and washer, and pull out the impeller, O-ring and the shim

CAUTION

- Turn the impeller counterclockwise at removal. This is to prevent impeller O-ring damage by the shaft screw threads



- | | |
|------------|----------------|
| A Impeller | B Impeller Nut |
|------------|----------------|

Impeller Installation Notes

- Before installing the impeller, fit the O-ring in the impeller
- Check that the O-ring is in good condition
- ★ If it is damaged, replace it with a new one



- | | |
|------------|----------|
| A Impeller | B O ring |
|------------|----------|

- Tighten the impeller nut to the specified torque (see Exploded View)

CAUTION

- Be careful not to damage the sealing surface of the mechanical seal
- Turn the impeller clockwise at installation. This is to prevent impeller O-ring damage by the shaft screw threads

Impeller Assembly Notes

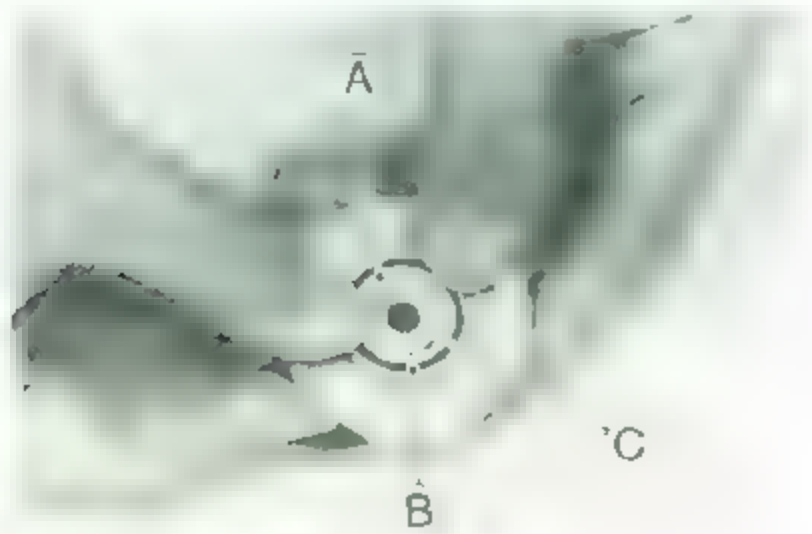
CAUTION

- Be careful not to damage the sealing surface of the mechanical seal
- Clean the sliding surface of the mechanical seal with a high flash point solvent and apply a little coolant to the

3-10 COOLING SYSTEM

sliding surface to give the mechanical seal initial lubrication

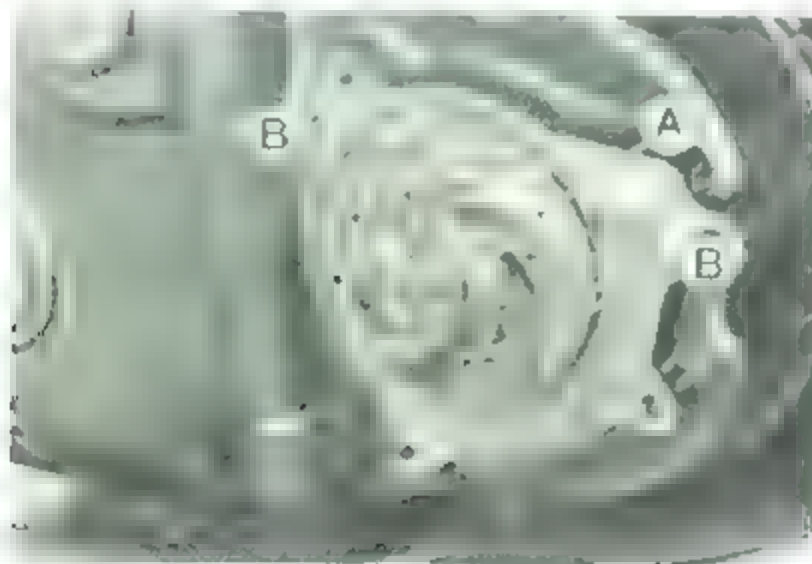
- Apply coolant to the surfaces of the rubber seal and sealing seat, and install the rubber seal and sealing seat into the impeller by pressing them by hand until the seat stops at the bottom of the hole.



A Sealing Seat C Apply coolant to the surfaces
B Rubber Seal

Impeller Inspection

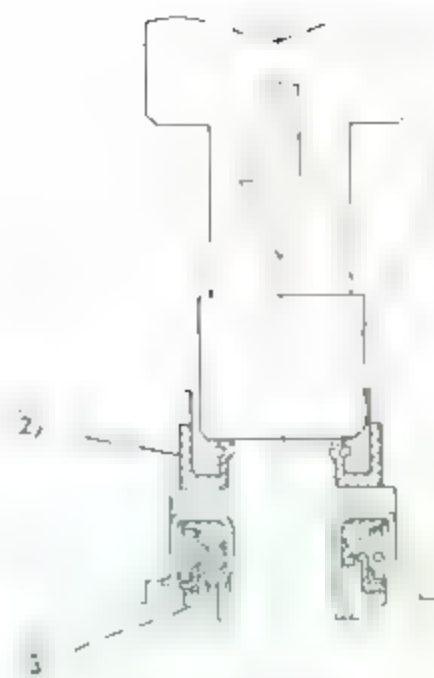
- Visually check the impeller.
- ★ If the surface is corroded or if the blades are damaged replace the impeller.



A Impeller B Blades

Mechanical Seal, Oil Seal Removal

- Remove
Impeller
Right Engine Cover (see Right Engine Cover Removal in the Engine Right Side/Left Side chapter)
- Press out the mechanical seal and oil seal from the inside of the right engine cover with a bearing driver set (special tool).



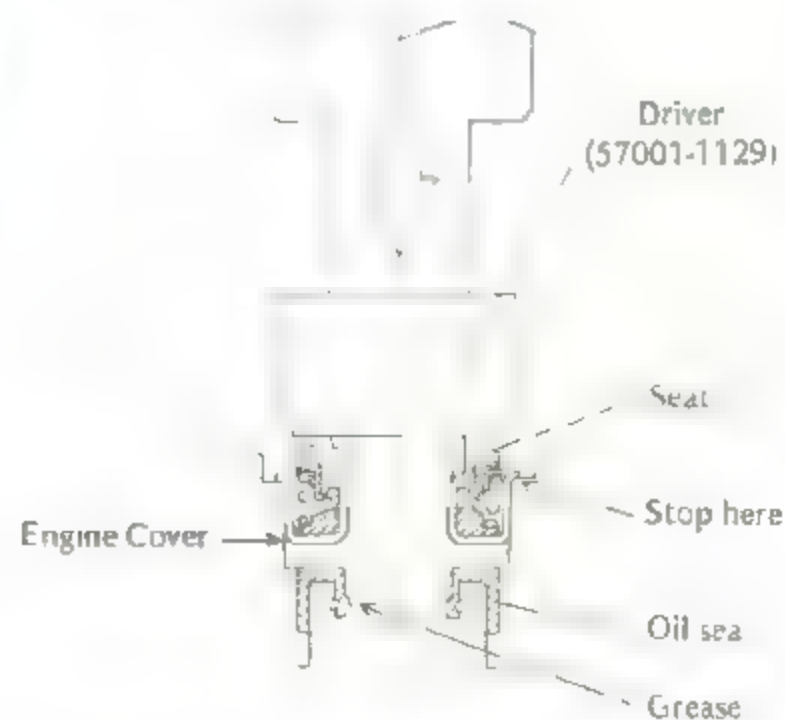
1 Bearing Driver Set 57001-1129
2 Oil Seal
3 Mechanical Seal

Mechanical Seal, Oil Seal Installation Notes

- Be sure to replace the mechanical seal and the oil seal
- Apply plenty of high temperature grease to the oil seal lips
- Press the oil seal into the hole from the outside of the right engine cover with a bearing driver set (special tool, 57001-1129) so that the spring side of the seal lips are toward the inside of the cover
- After pressing the oil seal, press the mechanical seal into the hole with a bearing driver (special tool) until its flange touches the step

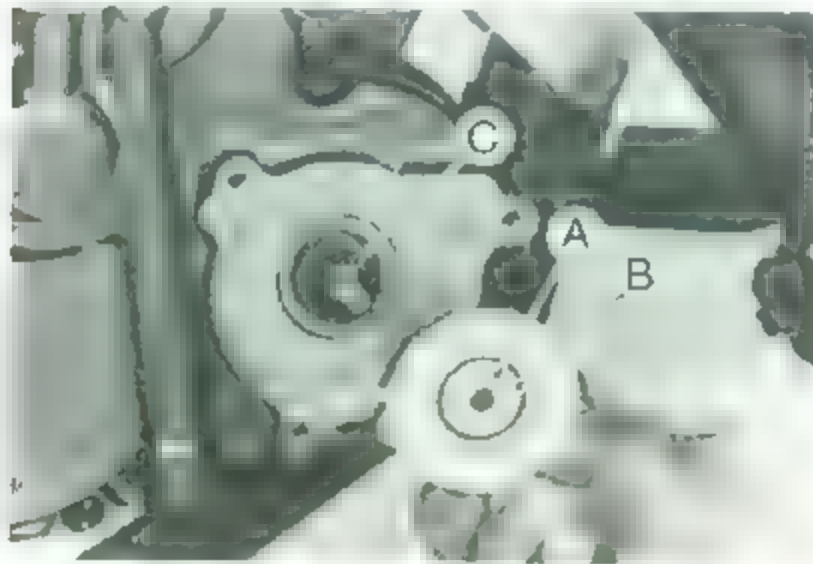
CAUTION

- Never tap on the mechanical seal, use a press only
- Be careful not to damage the sealing surface of the mechanical seal



Mechanical Seal Inspection

- Visually inspect the mechanical seal.
- ★ If any one of the parts is damaged, replace the mechanical seal as a unit.



A. Impeller Seating Seat Surface
B. Rubber Seal
C. Mechanical Seal Diaphragm

Hose Inspection

- In accordance with the Periodic Maintenance Chart, visually inspect the hoses for signs of deterioration. Squeeze the hose. A hose should not be hard and brittle, nor should it be soft or swollen.
- Replace any damaged hose.



A. Water Pump Hose

Radiator, Radiator Fan

Removal

- Remove
 - Lower Faring
 - Coolant (drain)
 - Upper Faring
 - Side Covers
 - Seat
 - Fuel Tank
- Disconnect
 - Fan Motor Lead Connector
 - Fan Switch Lead Connector



A. Fan Motor Lead Connector
B. Fan Switch Lead Connector

WARNING

- The radiator fan and fan switch are connected directly to the battery. The radiator fan may start even if the ignition switch is off. NEVER TOUCH THE RADIATOR FAN UNTIL THE ENGINE COMPLETELY COOLS OFF. TOUCHING THE FAN BEFORE THE ENGINE COOLS COULD CAUSE INJURY FROM THE FAN BLADES.

- Remove the fan motor mounting bolts, and take off the fan motor.

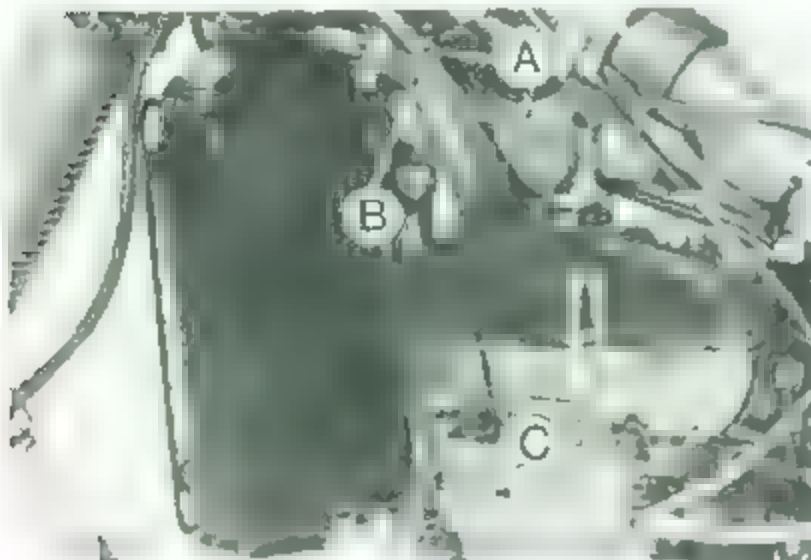


A. Mounting Bolts

B. Fan Motor

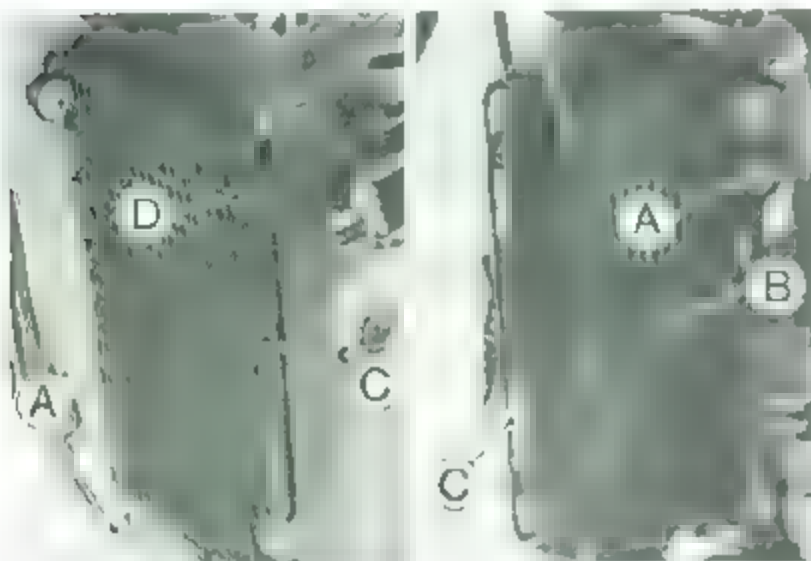
3-12 COOLING SYSTEM

- Pull off the reservoir tank hose, the water hose and the radiator hose from the radiator.



A. Reservoir Tank Hose C. Radiator Hose
B. Water Hose

- Remove the radiator mounting bolts, and take off the radiator taking care not to damage the radiator core

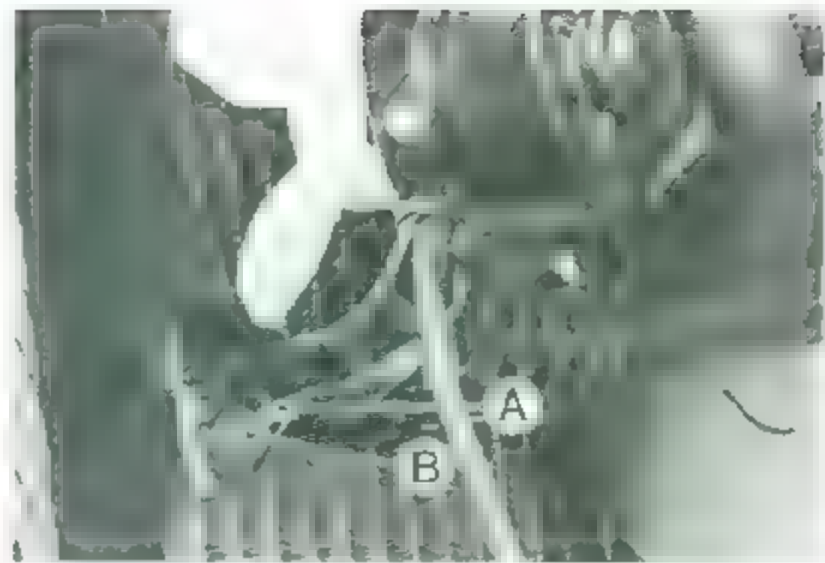


A. Mounting Bolts C. Grill
■ Radiator Core D. Mounting Screw

- Separate the grill from the radiator

Installation Notes

- Be sure to install the fan switch ground lead on the fan mounting bolt.
- Route the fan motor lead and the fan switch lead in accordance with the Wire Routing in the General Information chapter



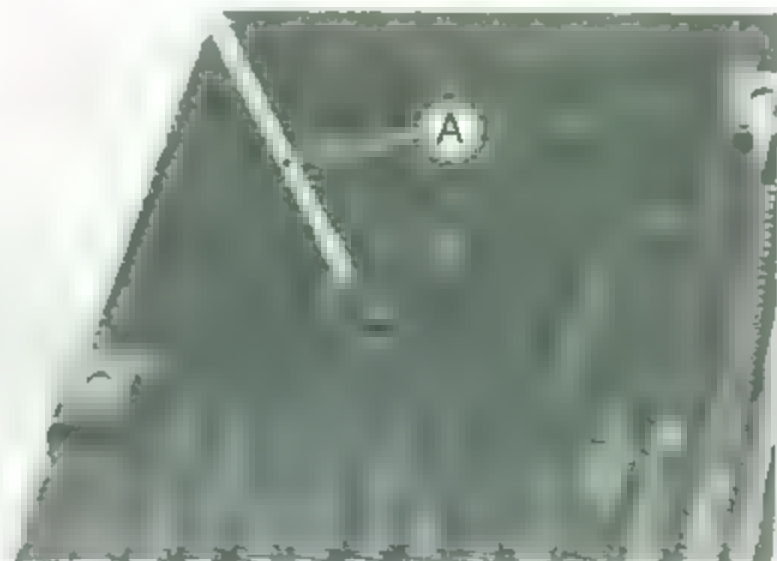
A. Ground Lead B. Mounting Bolt

Radiator Inspection

- Check the radiator core
- ★ If there are obstructions to air flow, remove them.
- ★ If the corrugated fins are deformed, carefully straighten them with the blade of a thin screw driver

CAUTION

- Do not tear the radiator tubes while straightening the

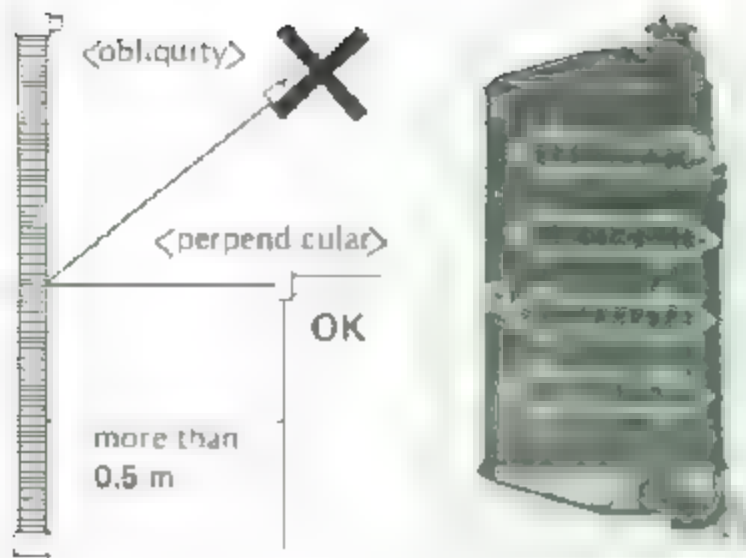


A. Thin Screwdriver

- ★ If the air passages of the radiator core are blocked more than 20% by unremovable obstructions or irreparably deformed fins, replace the radiator with a new one.

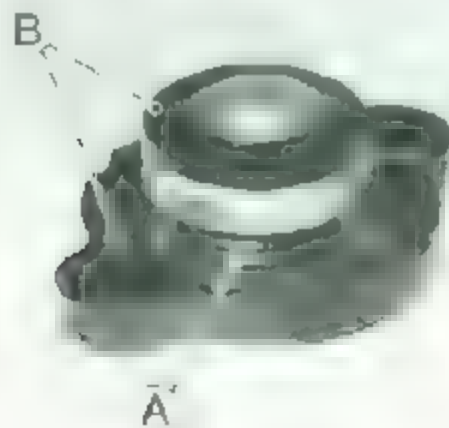
CAUTION

- When cleaning the radiator with compressed air, be careful of the following to avoid damage to the fins.
- Keep the air nozzle over 0.5 m (20 in.) away from the radiator
- Blow air perpendicularly to the radiator core
- Never blow air at an angle against the fins but straight through them in the direction of natural air flow.
- Never shake the air nozzle at a right angle against the fins, be sure to move it at a level with the fins.



Cap Inspection

- Check the condition of the valve spring, and the top and bottom valve seals of the radiator cap.
- ★ If any one of them shows visible damage, replace the cap.



A. Valve Spring B. Top and Bottom Valve Seals

- Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.
- Install the cap on a cooling system pressure tester.
- Watching the pressure gauge, pump the tester to build up the test pressure. The cap must open at the specified relief pressure (the gauge hand flicks down).



A. Pressure Tester B. Radiator Cap

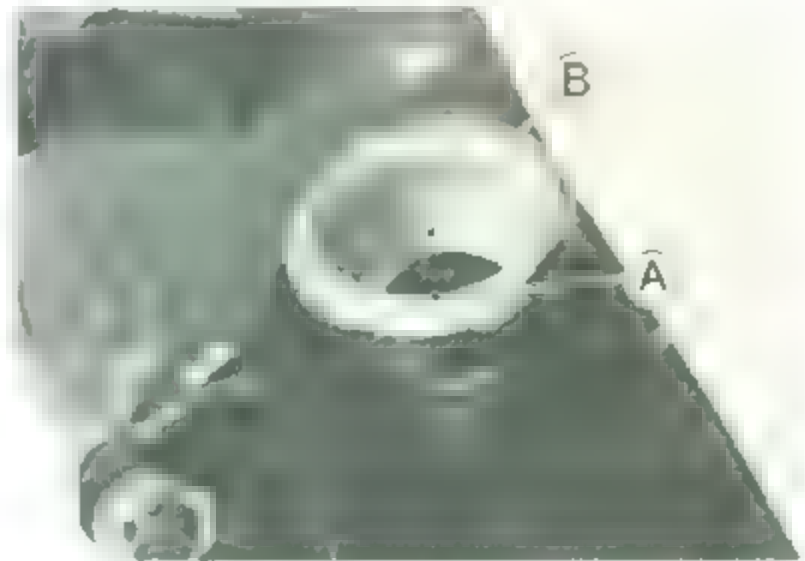
Radiator Cap Relief Pressure

93 ~ 123 kPa (0.95 ~ 1.25 kg/cm², 14 ~ 18 psi)

- Also, the cap must hold any pressure less than the relief pressure for at least 6 seconds.
- ★ If the cap cannot hold the pressure, or if the relief pressure is too high or too low, replace the cap with a new one.

Filler Neck Inspection

- Check the radiator filler neck for signs of damage.
- Check the condition of the top and bottom sealing seats in the filler neck. They must be smooth and clean for the radiator cap to function properly.



A. Top Sealing Seat B. Bottom Sealing Seat

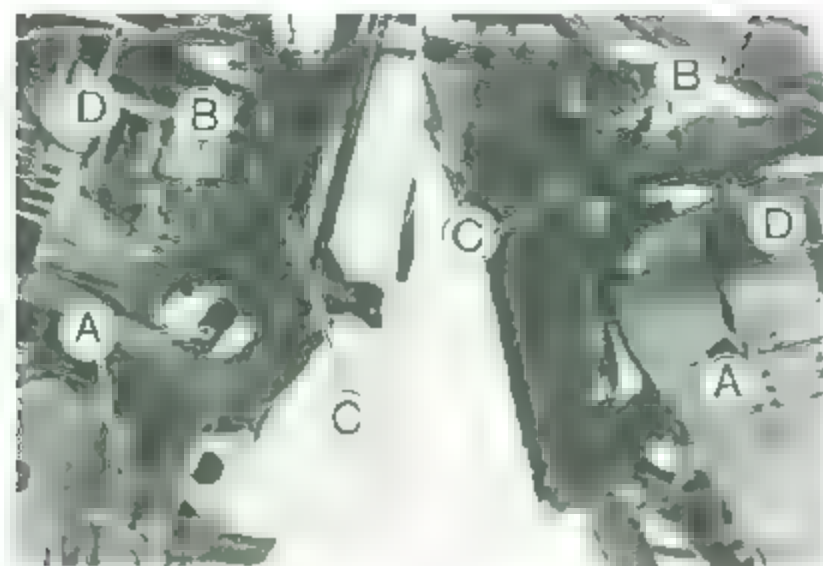
Radiator Hose, Water Hose, Reservoir Tank Hose, Air Vent Hose Inspection

- In accordance with the Periodic Maintenance Chart, visually inspect the hoses for signs of deterioration. Squeeze the hose. A hose should not be hard and brittle, nor should it be soft or swollen.
- Replace any damaged hose.

Radiator Hose, Water Hose, Reservoir Tank Hose, Air Vent Hose Installation Notes

- Install the radiator hose, water hose, reservoir tank hose or air vent hose being careful to follow the performed bends (see Exploded View, Hose Routing in the General Information chapter). Avoid sharp bending, kinking, flattening, or twisting.
- Tighten the hose clamps securely.

3-14 COOLING SYSTEM



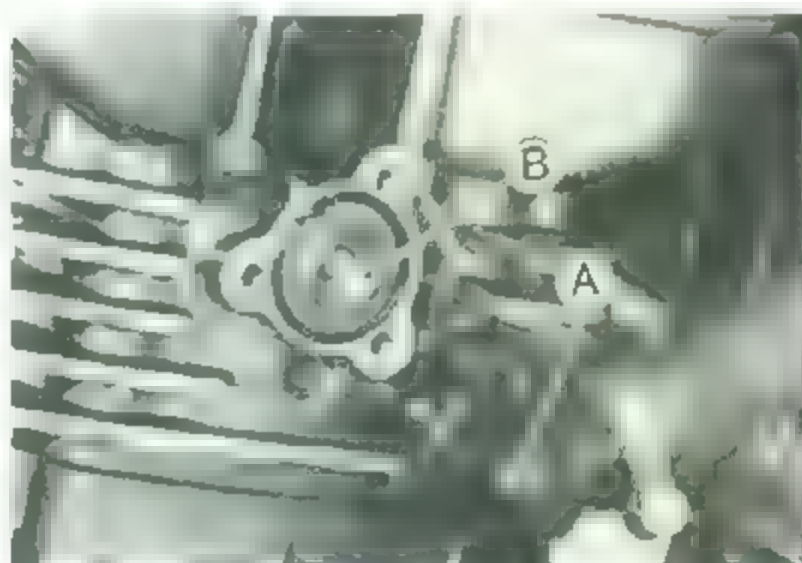
A. Radiator Hose
B. Water Hose

C. Reservoir Tank Hose
D. Air Vent Hose

Thermostat

Removal

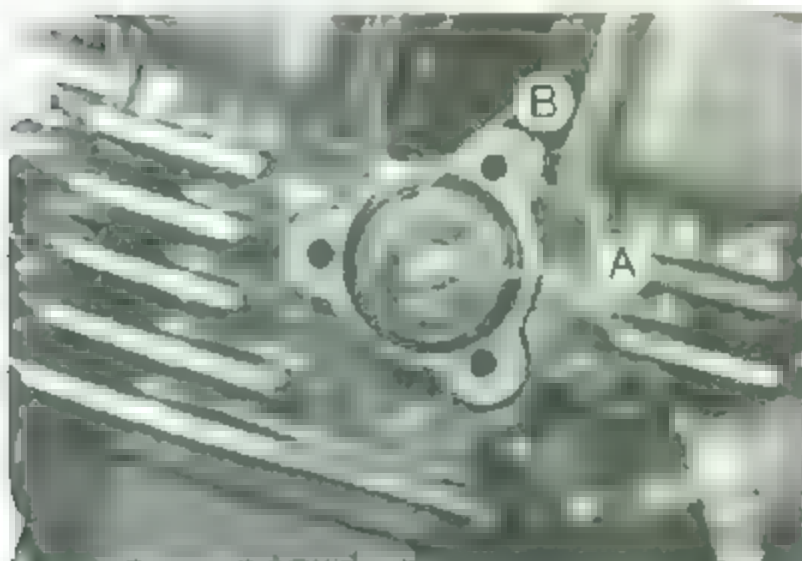
- Remove
 - Lower Faring
 - Coolant (drain)
 - Side Covers
 - Seat
 - Fuel Tank
- Remove the thermostat housing cap bolt, and take the thermostat out of housing



A. Thermostat Housing Cap B. Thermostat

Installation Note

- Put the thermostat into the housing so that the air bleeder hole is positioned toward the upper of the engine

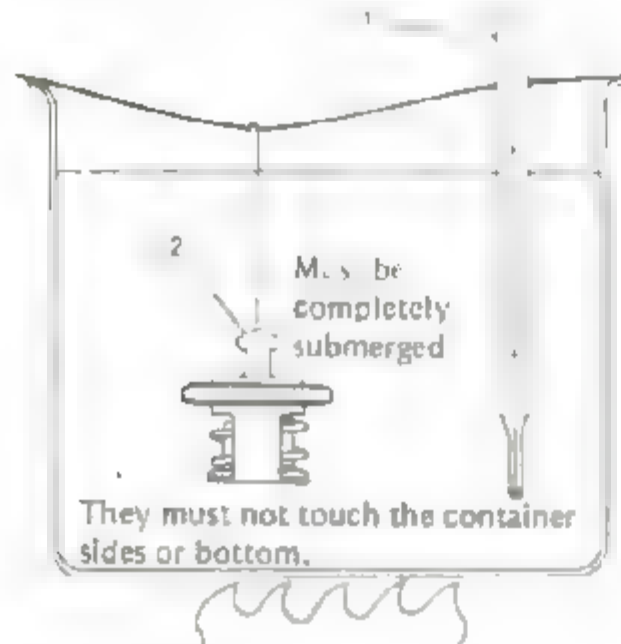


A. Thermostat

B. Air Bleeder Hole

Inspection

- Remove the thermostat, and inspect the thermostat valve at room temperature
- ★ If the valve is open, replace the valve with a new one
- To check valve opening temperature, suspend the thermostat and an accurate thermometer in a container of water
- Place the container over a source of heat and gradually raise the temperature of the water while stirring the water gently



1. Thermometer

2. Thermostat

- Watch the valve. As soon as the valve starts to open, note the temperature
- ★ If it is out of the specified range, replace the thermostat

Thermostat Valve Opening Temperature

69.5 ~ 72.5°C (157 ~ 162°F)

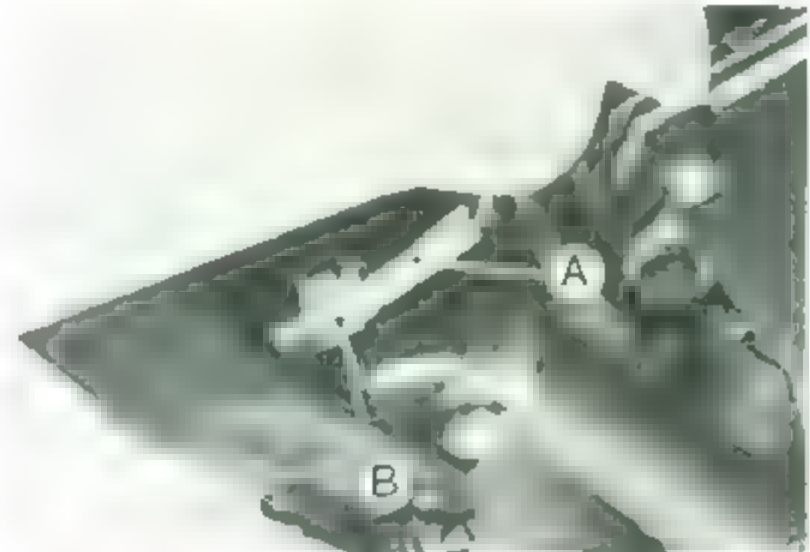
Thermostatic Fan Switch, Water Temperature Sensor

Thermostatic Fan Switch Removal

- Drain the coolant (see Coolant Draining)
- Disconnect the thermostatic fan switch lead connector
- Unscrew the sensor and remove it

CAUTION

- The fan switch should never be allowed to fall on a hard surface. Such a shock to this part can damage it.



A. Connector

B. Thermostatic Fan Switch

Thermostatic Fan Switch Installation Note

- Tighten the thermostatic fan switch to the specified torque (see Exploded View)

Thermostatic Fan Switch Inspection

- Refer to the Electrical System chapter

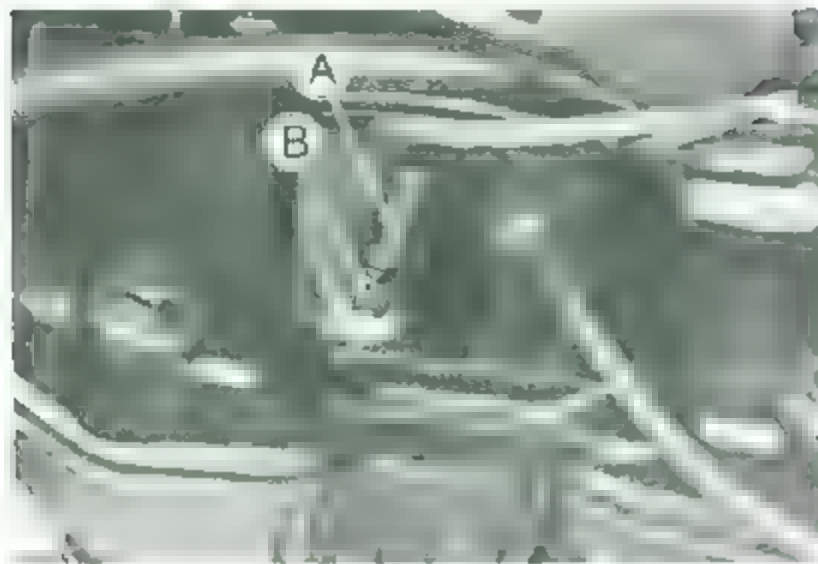
Water Temperature Sensor Removal

- Remove
 - Lower Fanning
 - Coolant (drain)
 - Side Covers
 - Seat
 - Fuel Tank
- Disconnect the water temperature sensor connector
- Unscrew the sensor and remove it

CAUTION

- The water temperature sensor should never be allowed to fall on a hard surface. Such a shock to this part can damage it.

3-16 COOLING SYSTEM



A. Connector

B. Water Temperature Sensor

Water Temperature Sensor Installation Notes

- Apply silicone sealant (Kawasaki Bond 56019-120) to the threads before installing the water temperature sensor.
- Tighten the water temperature sensor to the specified torque (see Exploded View).

Water Temperature Sensor Inspection

- Refer to the Electrical System chapter

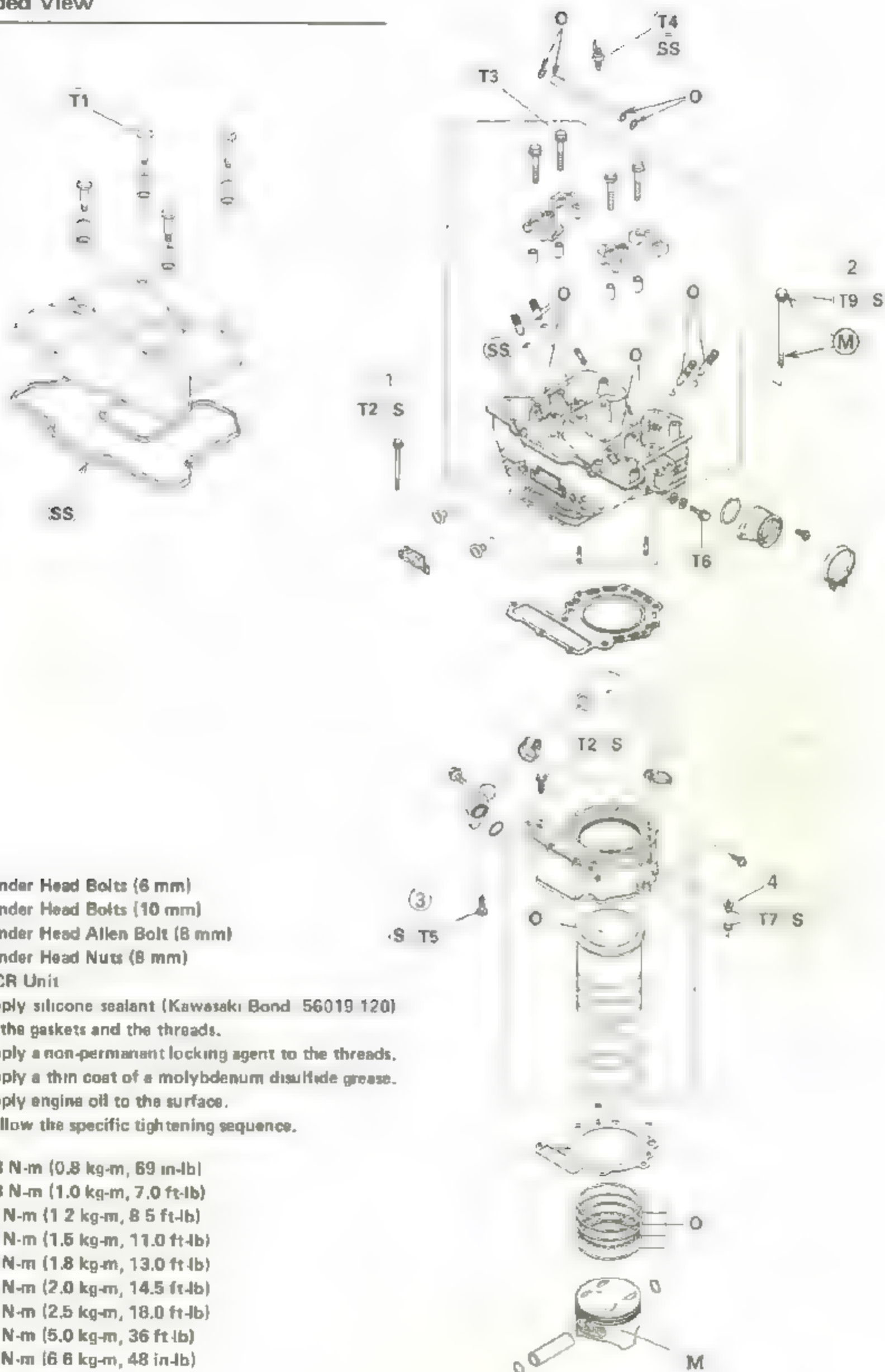
Engine Top End

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4-2 ENGINE TOP END

Exploded View



1. Cylinder Head Bolts (6 mm)
2. Cylinder Head Bolts (10 mm)
3. Cylinder Head Allen Bolt (8 mm)
4. Cylinder Head Nuts (8 mm)
5. KACR Unit

SS: Apply silicone sealant (Kawasaki Bond 56019 120) to the gaskets and the threads.

L: Apply a non-permanent locking agent to the threads.

M: Apply a thin coat of a molybdenum disulfide grease.

O: Apply engine oil to the surface.

S: Follow the specific tightening sequence.

T1: 7.8 N·m (0.8 kg-m, 69 in-lb)

T2: 9.8 N·m (1.0 kg-m, 7.0 ft-lb)

T3: 12 N·m (1.2 kg-m, 8.5 ft-lb)

T4: 15 N·m (1.5 kg-m, 11.0 ft-lb)

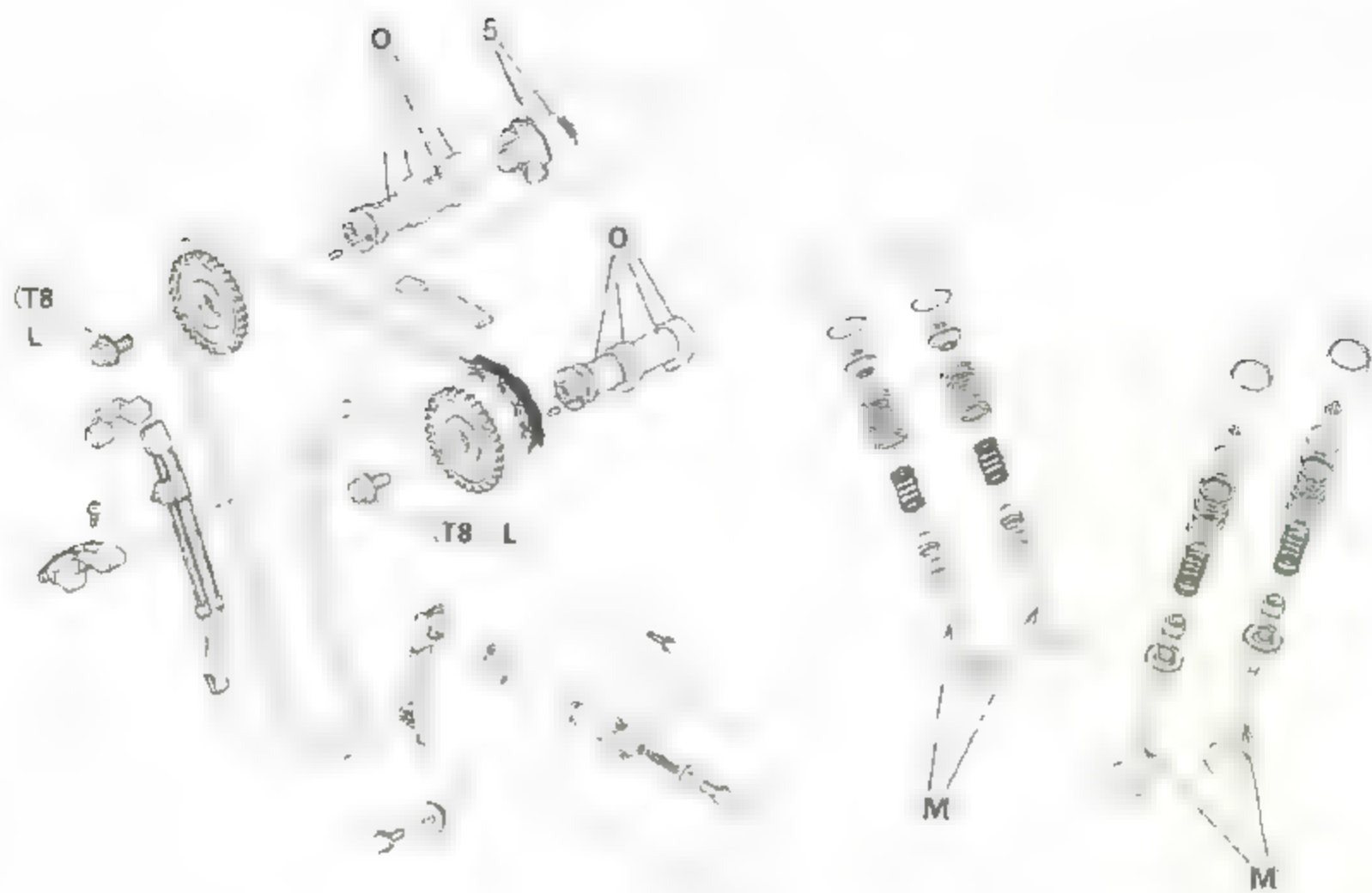
T5: 18 N·m (1.8 kg-m, 13.0 ft-lb)

T6: 20 N·m (2.0 kg-m, 14.5 ft-lb)

T7: 25 N·m (2.5 kg-m, 18.0 ft-lb)

T8: 49 N·m (5.0 kg-m, 36 ft-lb)

T9: 65 N·m (6.6 kg-m, 48 in-lb)

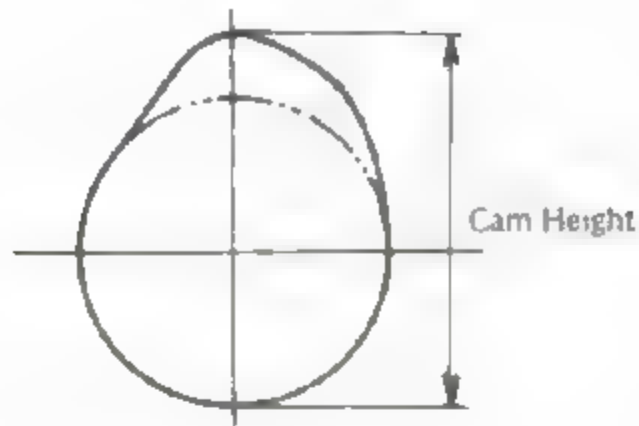


4-4 ENGINE TOP END

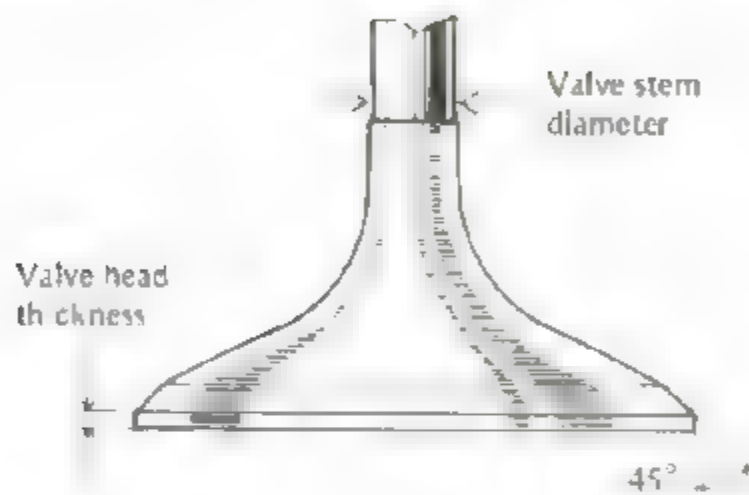
Specifications

Item		Standard	Service Limit
Camshaft, Chain:			
Cam height:	Inlet	36.75 ~ 36.85 mm	36.65 mm
	Exhaust	36.25 ~ 36.35 mm	36.15 mm
Camshaft bearing oil clearance		0.030 ~ 0.064 mm	0.15 mm
Camshaft journal diameter		22.949 ~ 22.970 mm	22.92 mm
Camshaft bearing inside diameter		23.000 ~ 23.013 mm	23.07 mm
Camshaft chain 20-link length		127.0 ~ 127.4 mm	128.9 mm
Cylinder Head:			
Cylinder compression		(Usable Range) 530 ~ 855 kPa (5.4 ~ 8.7 kg/cm ² , 77 ~ 124 psi)	
Cylinder head warp		---	0.05 mm
Valves:			
Valve clearance (when cold):	Inlet	0.10 ~ 0.20 mm	---
	Exhaust	0.15 ~ 0.25 mm	
Valve head thickness:	Inlet	1.0 mm	0.5 mm
	Exhaust	1.0 mm	0.7 mm
Valve stem bend		Less than 0.01 mm TIR	0.05 mm TIR
Valve stem diameter:	Inlet	6.965 ~ 6.980 mm	6.95 mm
	Exhaust	6.955 ~ 6.970 mm	6.94 mm
Valve guide inside diameter		7.000 ~ 7.015 mm	7.08 mm
Valve guide/valve clearance (wobble method):	Inlet	0.04 ~ 0.11 mm	0.24 mm
	Exhaust	0.05 ~ 0.12 mm	0.24 mm
Valve seating surface:			
Outside diameter	Inlet	36.9 ~ 37.1 mm	
	Exhaust	31.9 ~ 32.1 mm	
Width	Inlet	0.8 ~ 1.2 mm	---
	Exhaust	0.8 ~ 1.2 mm	---
Valve seating area width		0.8 ~ 1.2 mm	---
Valve spring free length	Inner	37.6 mm	36.2 mm
	Outer	40.5 mm	39.0 mm
Cylinder, Piston:			
Cylinder inside diameter:	KL650-B1	100.000 ~ 100.012 mm	100.10 mm
	KL500-B1	89.000 ~ 89.012 mm	89.10 mm
Piston diameter:	KL650-B1	99.942 ~ 99.957 mm	99.80 mm
	KL500-B1	88.942 ~ 88.957 mm	88.80 mm
Piston/cylinder clearance		0.043 ~ 0.070 mm	---
Oversize piston and rings		+0.5 mm and +1.0 mm	-
Piston ring/groove clearance	Top	0.03 ~ 0.07 mm	0.17 mm
	2nd	0.02 ~ 0.06 mm	0.16 mm
	Oil	2.81 ~ 2.83 mm	2.91 mm
Piston ring groove width:	Top	1.22 ~ 1.24 mm	1.32 mm
	2nd	1.21 ~ 1.23 mm	1.31 mm
	Oil	2.81 ~ 2.83 mm	2.91 mm
Piston ring thickness:			
Top & 2nd		1.17 ~ 1.19 mm	1.10 mm
Piston ring end gap			
Top & 2nd		0.2 ~ 0.4 mm	0.7 mm

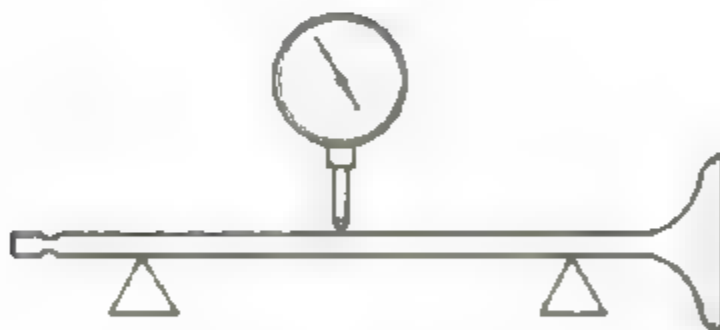
Cam Height Measurement



Valve Head



Valve Stem Bend



Special Tools

Compression Gauge: 57001-221



Compression Gauge Adapter Hose: 57001-1183



Valve Spring Compressor Assembly: 57001-241



Valve Spring Compressor Adapter: 57001-243



Valve Guide Arbor: 57001-163



Valve Guide Reamer: 57001-162



Valve Seat Cutter Holder, $\Phi 7$: 57001-1126



4-6 ENGINE TOP END

Valve Seat Cutter Holder Bar: 57001-1128



Valve Seat Cutter, 45° - $\phi 35.0$: 57001-1116



Valve Seat Cutter, 45° - $\phi 41.5$: 57001-1117



Valve Seat Cutter, 32° - $\phi 35.0$: 57001-1121



Valve Seat Cutter, 32° - $\phi 38.5$: 57001-1122



Valve Seat Cutter, 60° - $\phi 41.0$: 57001-1124



Piston Pin Puller Assembly: 57001-910



Piston Pin Puller Adapter: 57001-1211



Piston Ring Pliers: 57001-115



Sealant

Kawasaki Bond (Silicone Sealant): 56019-120



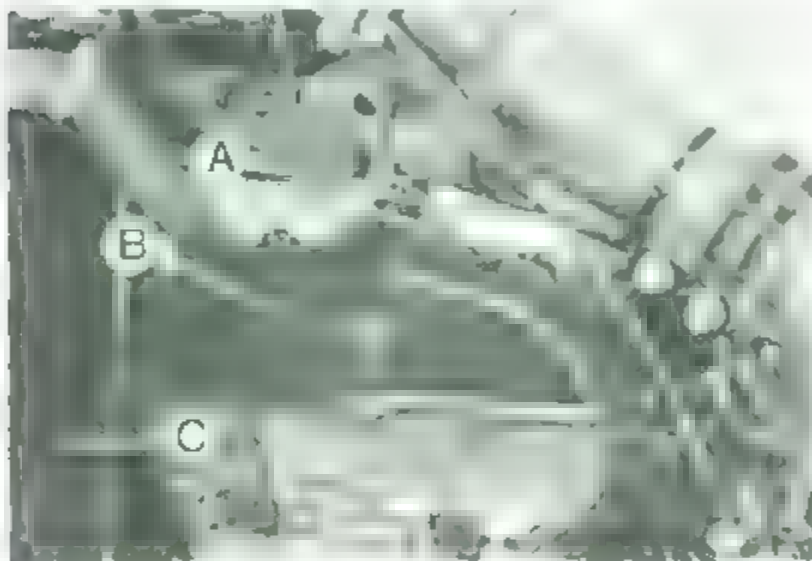
Cylinder Head Cover

Removal

- Remove the
 - Side Covers
 - Seat
 - Fuel Tank
 - Radiator Fan
 - Ignition Coil
 - Water Temperature Sensor Connector
- Remove the cylinder head cover bolts, and take off the cover toward the left side.

CAUTION

- Be careful not to damage the radiator core.



A Cover Bolts
B Cover

C Radiator Core

Installation Notes

- Apply silicone sealant (Kawasaki Bond[®] 56019-120) to the cylinder head as shown.



1 Silicone Sealant Applied Area

- Tighten the cover bolts to the specified torque (see Exploded View).

Camshaft Chain Tensioner

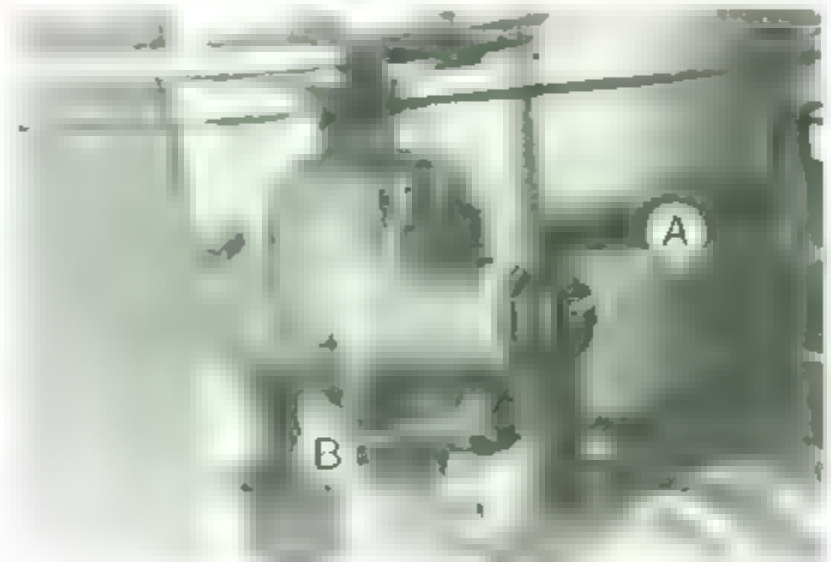
Removal

CAUTION

This is a non-return type camshaft chain tensioner. The push rod does not return to its original position once it moves out to take up camshaft chain slack. Observe all the rules listed below.

- When removing the tensioner, do not take out the mounting bolts only halfway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "Installation".
- Do not turn over the crankshaft while the tensioner is removed. This could upset the camshaft chain timing, and damage the valves.

- Remove the cap bolt, washer and spring.
- Remove the mounting bolts, and take off the chain tensioner.

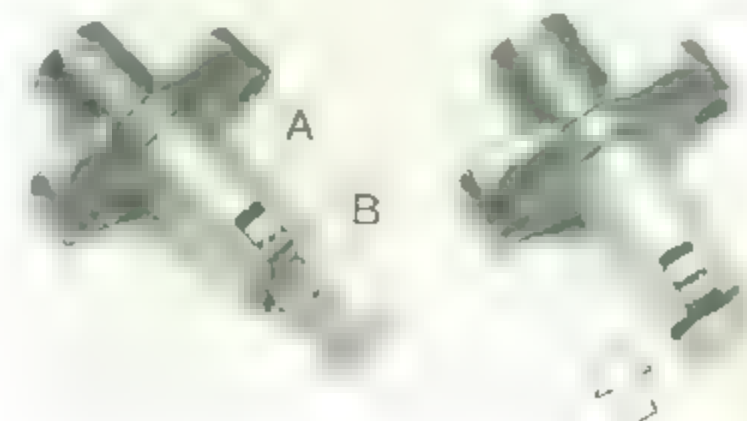


A. Cap Bolt

B. Mounting Bolts

Installation Notes

- Unlock the ratchet stopper and push the rod into the tensioner body.

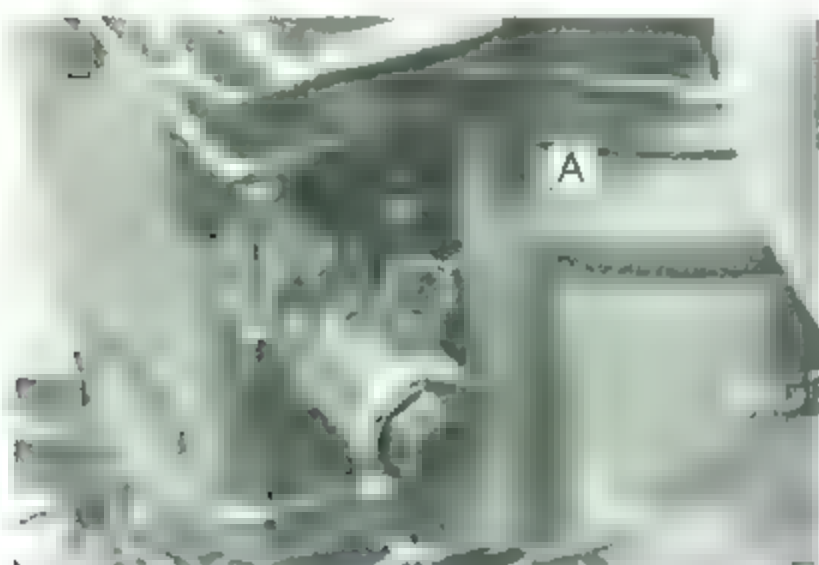


A. Ratchet Stopper

B. Push Rod

4-8 ENGINE TOP END

- Install the chain tensioner body with the arrow on it pointing downwards.



A Arrow

Camshaft, Camshaft Chain

Camshaft Removal

- Remove
 - Cylinder Head Cover
 - Camshaft Chain Tensioner
 - Camshaft Caps Oil Pipe and O rings



A Cap Bolts

B Oil Pipe

- Remove the camshafts

CAUTION

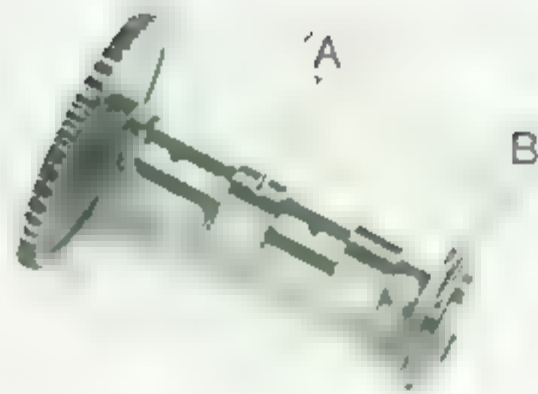
- The crankshaft may be turned, while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.

Camshaft Installation Notes (Including Camshaft Chain Timing Procedure)

- Apply engine oil to all cam parts. If the camshaft(s) and, or cylinder head are replaced with new ones, apply a thin coat of molybdenum disulfide grease to the new cam part surfaces.

NOTE

- The exhaust camshaft has the compression release mechanism. Be careful not to mix up these shafts when installing.

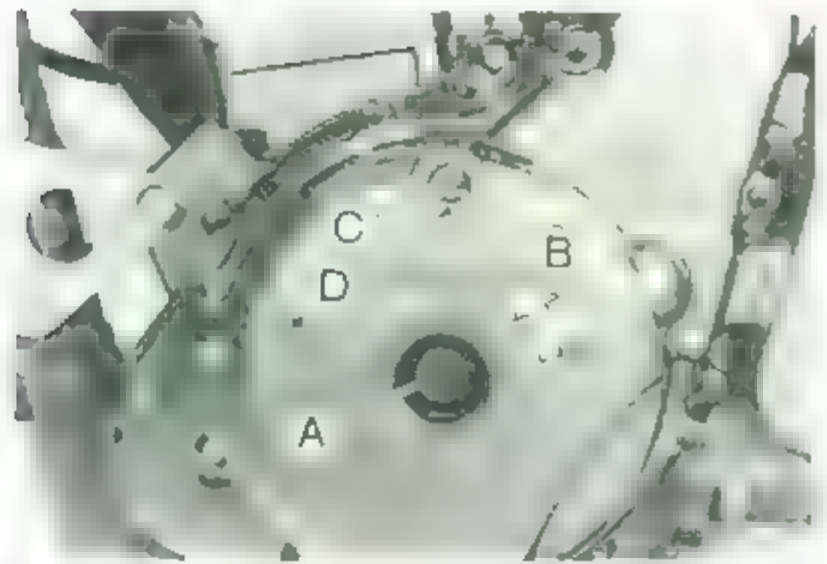


A. Exhaust Camshaft
B. Compression Release Mechanism

NOTE

○ Be sure to set properly the camshaft chain timing when installing the camshaft

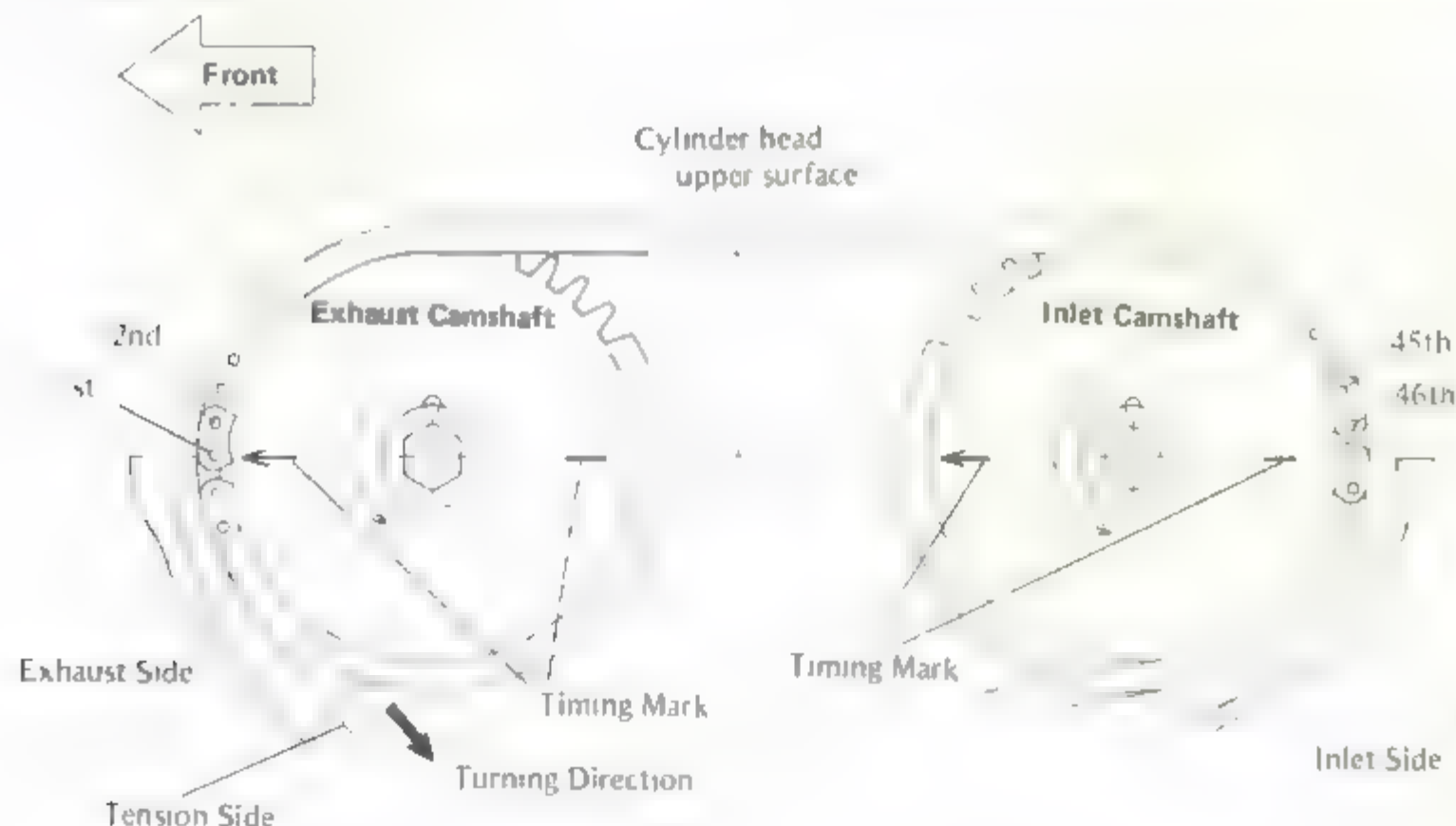
- Remove the two caps on the alternator cover
- Posit on the crankshaft at TDC.
- Using a wrench on the crankshaft rotation bolt turn the crankshaft counterclockwise until the "T" TDC mark on the rotor is aligned with the notch in the edge of the upper hole in the magneto cover



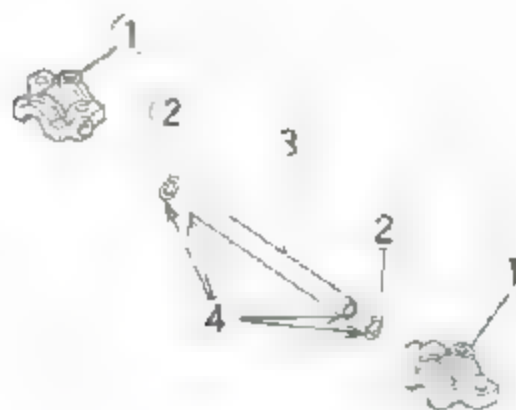
A. Rotation Bolt
B. Counterclockwise
C. "T" TDC Mark
D. Notch

- Engage the camshaft chain with the camshaft sprockets
- Pull the tension side (exhaust side) of the chain taut to install the chain
- The timing marks on the exhaust sprocket must be aligned with the cylinder head upper surface and pointed toward the front.
- Pull the chain taut and fit it onto the camshaft sprocket.
- Starting with the timing mark on the front of the exhaust sprocket, count to the 46th pin. Feed the exhaust camshaft through the chain and align that 46th pin with the timing mark on the inlet camshaft sprocket
- Flush out the cylinder head oil pipe with a high flash point solvent
- Fill the oil pipe with engine oil. This shortens air bleeding time and prevents engine damage
- Check that the O-rings are in good condition
- ★ If they are damaged, replace them with new ones
- Apply engine oil to both ends of the head oil pipe to prevent damage to the O-rings in the camshaft caps.

(Left Side View)



4-10 ENGINE TOP END

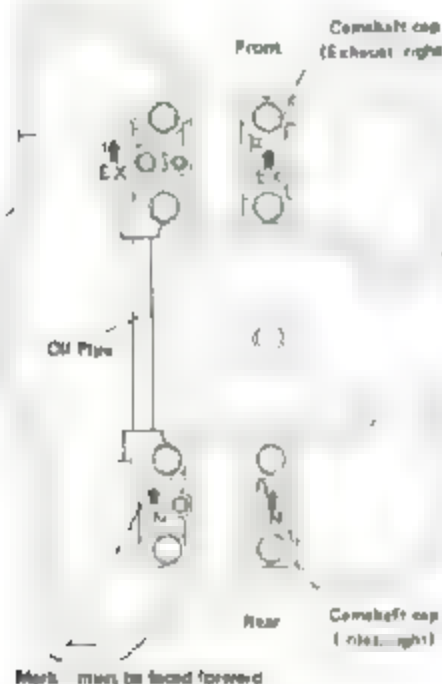


1. Camshaft Cap
2. O ring
3. Oil Pipe
4. Apply engine oil

- Apply engine oil to the camshaft bearing portion
- Install the camshaft caps in the correct locations as shown in the figure below. Location alphabets are marked on the each caps

CAUTION

- The camshaft caps are machined with the cylinder head. So, if cap is installed in a wrong location, the camshaft may seize because of improper oil clearance in the bearings



- First tighten down the two camshaft cap bolts (#1 and #2 bolts in the figure) evenly to seat the camshafts in place, then tighten all bolts to the specified torque (see Exploded View), following the specified tightening sequence

CAUTION

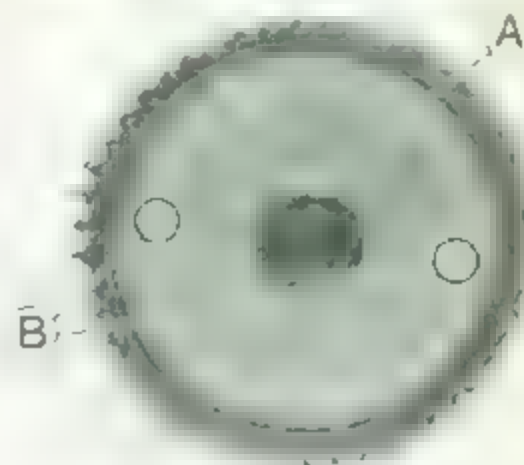
- After this procedure, if any resistance is felt while turning over the crankshaft, stop immediately, and check the camshaft chain timing. Valves will be bent if the timing is not properly set.



Camshaft and Sprocket Assembly Notes

The inlet and exhaust sprockets are identical.

- Install the sprockets so that the marked side faces outwards. Fit the knock pin into the camshaft hole



A. Knock Pin

B. Mark

- Apply a non-permanent locking agent to the camshaft sprocket bolts and tighten them to the specified torque (see Exploded View)
- If a new camshaft is to be used, apply a thin coat of molybdenum disulfide grease to the cam surfaces.

Camshaft Bearing Oil Clearance Inspection

The journal wear is measured using plastigauge (press gauge), which is inserted into the clearance to be measured. The plastigauge indicates the clearance by the amount it is compressed and widened when the parts are assembled.

- Cut strips of plastigauge to journal width. Place a strip on each journal parallel to the camshaft with the camshaft installed in the correct position and so that the plastigauge will be compressed between the journal and camshaft cap.
- Install the camshaft caps, tightening the bolts in the correct sequence to the specified torque.

NOTE

○ Do not turn the camshaft when the plastigauge is between the journal and camshaft cap.

- Remove the camshaft caps again, and measure the plastigauge width to determine the clearance between each journal and the camshaft cap.
- Measure the widest portion of the plastigauge.



A Plastigauge Width

- ★ If any clearance exceeds the service limit, replace the camshaft with a new one and measure the clearance again.
- ★ If the clearance still remains out of the limit, replace the cylinder head unit.

Camshaft Bearing Oil Clearance

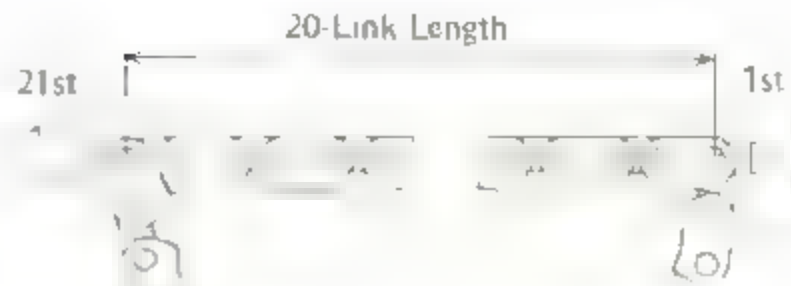
Standard: 0.030 ~ 0.064 mm
Service Limit: 0.15 mm

Camshaft Chain Wear

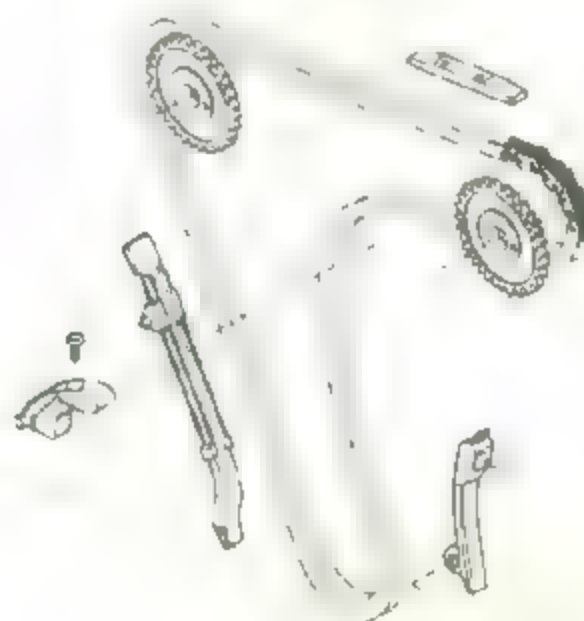
- Hold the chain taut with a force of about 5 kg in some manner and measure a 20-link length. Since the chain may wear unevenly, take measurements at several places.
- ★ If any measurement exceeds the service limit, replace the chain.

Camshaft Chain 20-Link Length

Standard: 127.0 ~ 127.4 mm
Service Limit: 128.9 mm

**Camshaft Chain Guide Wear**

- Visually inspect the rubber on the guides.
- ★ If the rubber is damaged, cut, or is missing pieces, replace the guides.



4-12 ENGINE TOP END

KAWASAKI Automatic Compression Release (KACR)

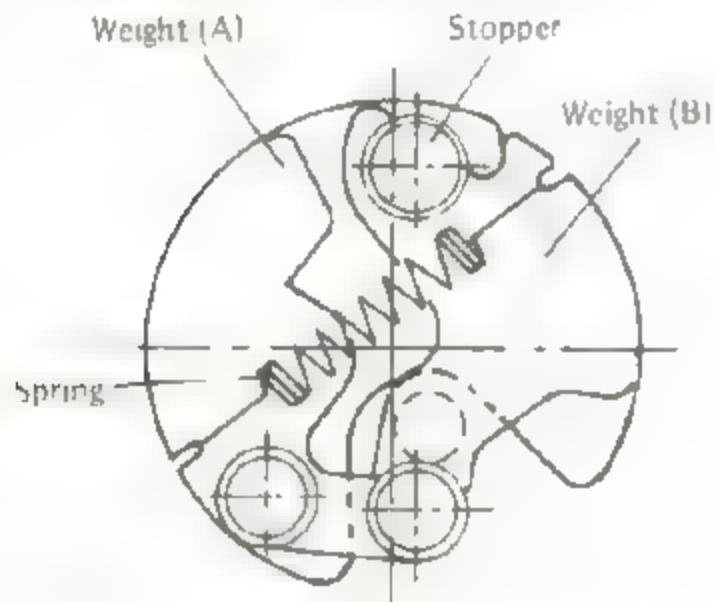
Due to the simplicity of the mechanism, no periodic maintenance is needed. There are only two symptoms of problems with the KACR mechanism: compression is not released during starting, and compression is released during running.

(1) If compression is not released during starting, the weights are not returning to their rest position.

- Remove the cylinder head cover.
- Visually inspect the spring.
- ★ If the spring is damaged, deformed, or missing, replace it.
- Remove the spring and move the weights back and forth.
- ★ If the weights do not move smoothly all the way, replace the exhaust camshaft.

Running Position

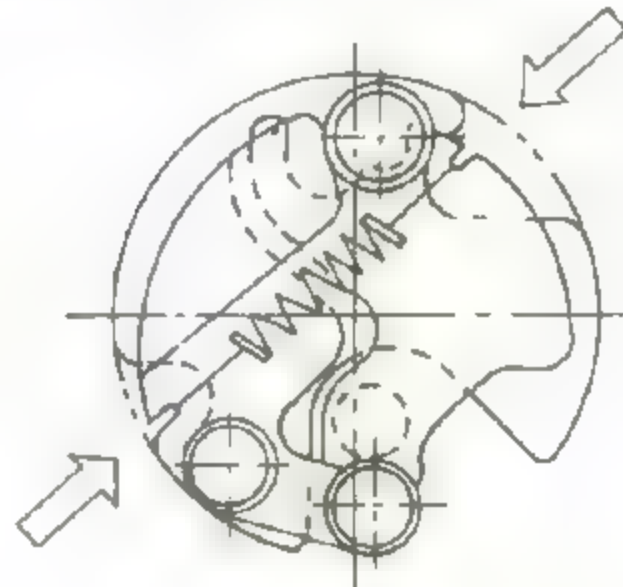
(compression is not released)



(2) If compression is released while the engine is running, the weights are not swinging out.

- Remove the spring and move the weights back and forth.
- ★ If the weights do not move easily from the retracted position, replace the exhaust camshaft.

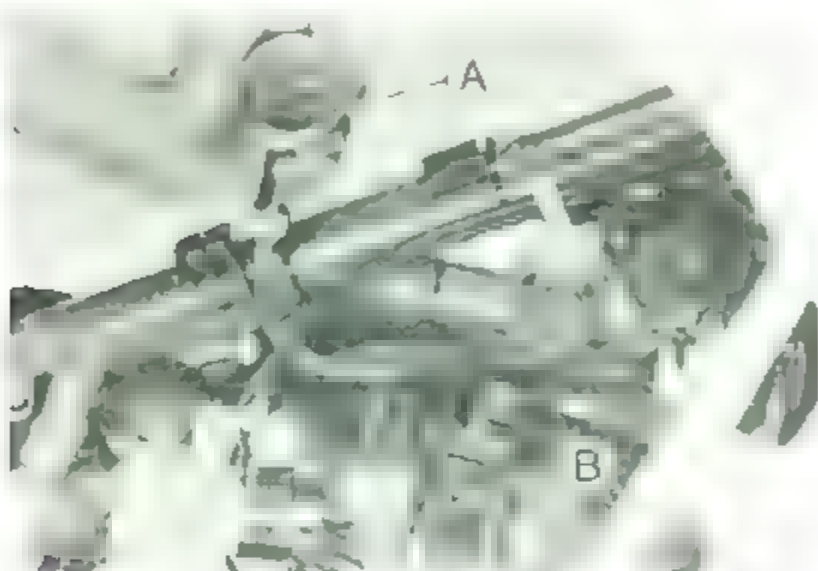
Retracted or Rest Position (compression is released)



Cylinder Head

Compression Measurement

- Remove:
 - Upper Fairing
 - Side Covers
 - Seat
- Thoroughly warm up the engine so that engine oil between the piston and cylinder wall will help seal compression as it does during normal running.
- Stop the engine, remove the fuel tank and the spark plug, and attach the compression gauge (special tool) and the adapter hose (special tool) firmly into the spark plug hole.



A Compression Gauge 57001-221
B Compression Gauge Adapter Hose 57001-1183

- Using the starter motor, turn the engine over with the throttle fully open until the compression gauge stops rising; the compression is the highest reading obtainable.

Cylinder Compression(Usable Range)

530 ~ 855 kPa
(5.4 ~ 8.7 kg/cm², 77 ~ 124 psi)

- ★ If cylinder compression is higher than the usable range, check the following:

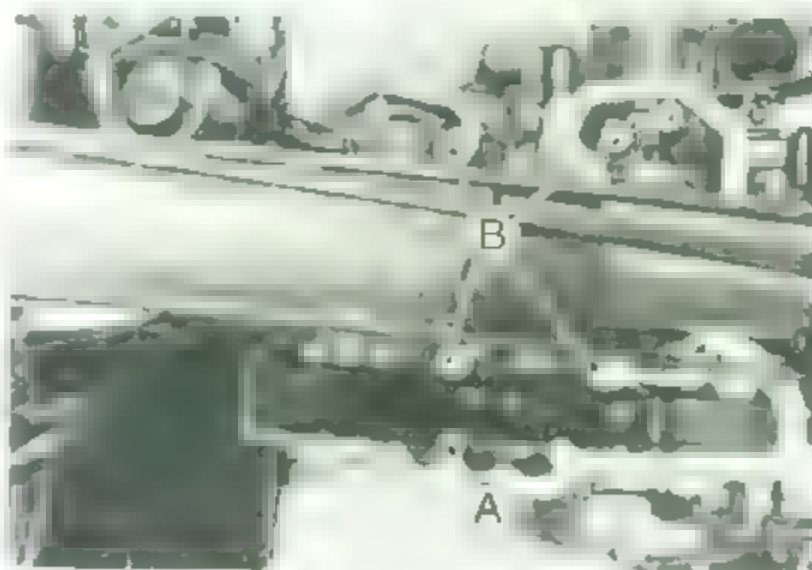
- (1) Carbon build up on the piston head and cylinder head - clean off any carbon on the piston head and cylinder head.
- (2) Cylinder head gasket, cylinder base gasket - use only the proper gaskets. The use of a gasket of incorrect thickness will change the compression.
- (3) Valve stem oil seals and piston rings - rapid carbon accumulation in the combustion chamber may be caused by damaged valve stem oil seals and/or damaged piston oil rings. This may be indicated by white exhaust smoke.
- (4) Compression release cam spring is damaged, deformed, missing, or weights do not move smoothly.

- ★ If cylinder compression lower than the usable range, check the following:

- (1) Gas leakage around the cylinder head - replace the damaged gasket and check the cylinder head warp.
- (2) Condition of the valve seating.
- (3) Valve clearance.
- (4) Piston/cylinder clearance, piston seizure.
- (5) Piston ring, piston ring groove.
- (6) Compression release weights do not move smoothly.

Removal

- Remove:
 - Fairings
 - Coolant (drain)
 - Exhaust Pipe
 - Side Covers
 - Seat
 - Fuel Tank
 - Carburetor
 - Water Hose
 - Radiator Fan
 - Ignition Coil
 - Water Temperature Sensor Connector (disconnect)
 - Cylinder Head Cover
 - Camshaft Chain Tensioner
 - Camshafts
 - Cylinder Head Bracket
 - Main Oil Pipe Mounting Bolt (loosen)
 - Main Oil Pipe Upper Banjo Bolt
 - Left Rubber Damper for Fuel Tank
- Remove the cylinder head bolts and nuts in following order:
 1. 6 mm Bolts
 2. 8mm Allen Bolt
 3. 8 mm Nuts
 4. 10 mm Bolts



A. 6 mm Bolts

B. 10 mm Bolts

4-14 ENGINE TOP END



A 8 mm Allen Bolt B 8 mm Nuts

- Lift off the cylinder head toward the left side, and remove the cylinder head gasket

NOTE

- Tap lightly up the cylinder head with a rubber mallet to separate from the cylinder

CAUTION

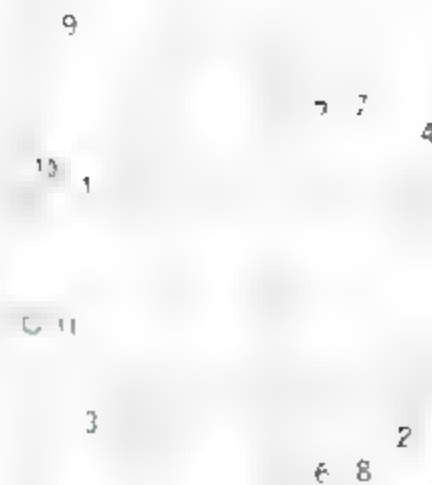
- Be careful not to damage the radiator core



A Rubber Mallet

Installation Notes

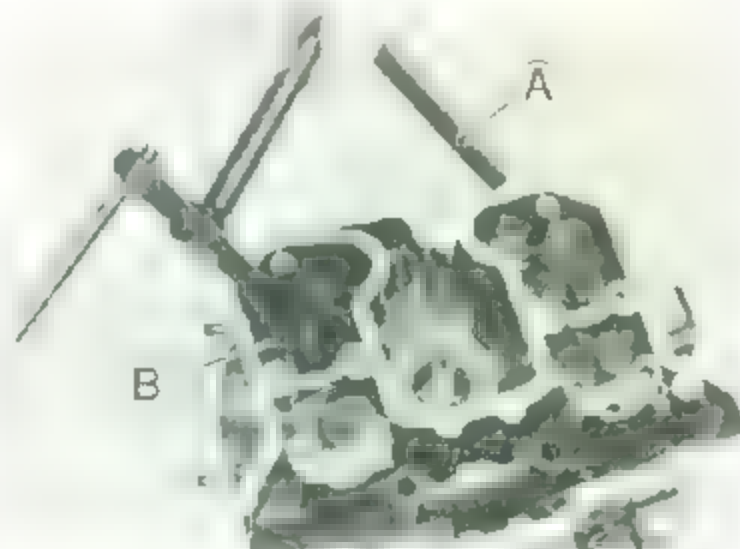
- The camshaft caps are machined together with the cylinder head, so if a new cylinder head is installed, use the caps that are supplied with the new head
- Apply a molybdenum disulfide grease to the cylinder head bolts (10 mm) seating surface and threads
- Tighten the cylinder head bolts and nuts to the specified torque in following order
- Thoroughly warm up the engine, and then let it cool completely. Now retighten the cylinder head nuts and Allen bolt to the specified torque.



- 1 → 4 : Cylinder Head Bolts (10 mm)
Torque them first to 20 N·m (2.0 kg·m, 14.5 ft·lb) and then to 65 N·m (6.6 kg·m, 48 ft·lb)
- 5 → 6 : Cylinder Head Nuts (8 mm)
25 N·m (2.5 kg·m, 18.0 ft·lb)
- 7 → 8 : Cylinder Head Nuts (Retighten)
25 N·m (2.5 kg·m, 18.0 ft·lb)
- 9 : Cylinder Head Allen Bolt (8 mm)
18 N·m (1.8 kg·m, 13.0 ft·lb)
- 10 → 11 : Cylinder Head Bolts (6 mm)
9.8 N·m (1.0 kg·m, 8.7 in·lb)

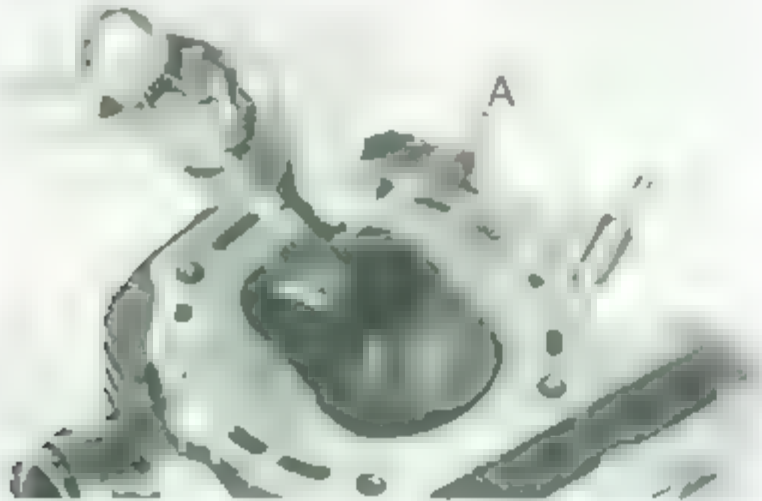
Disassembly and Assembly (Valve Mechanism Removal and Installation)

- Use the valve spring compressor assembly (spec. a tool) and the adapter (spec. a tool) to press down the valve spring retainer and remove the split keepers
- Be careful not to damage the studs on the cylinder surface.



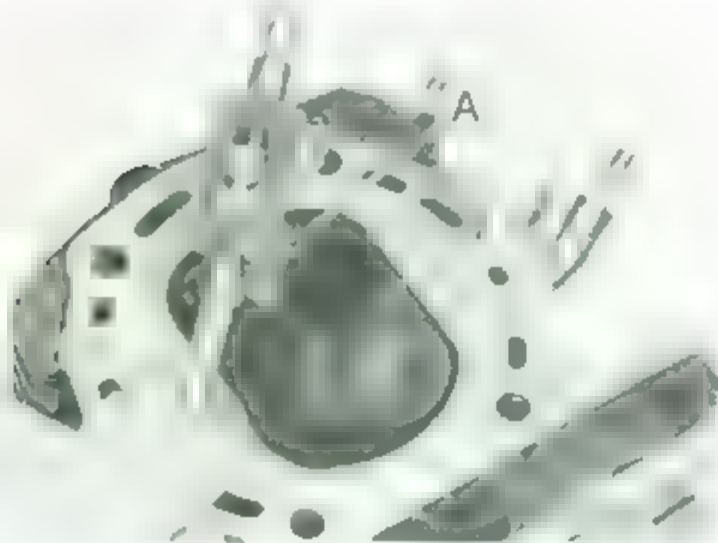
A. Valve Spring Compressor Assembly: 57001-241
B. Adapter: 57001-243

- Heat the area around the valve guide to about 120 ~ 150°C (248 ~ 302 °F), and hammer lightly on valve guide arbor (special tool) to remove the guide from the top of the head



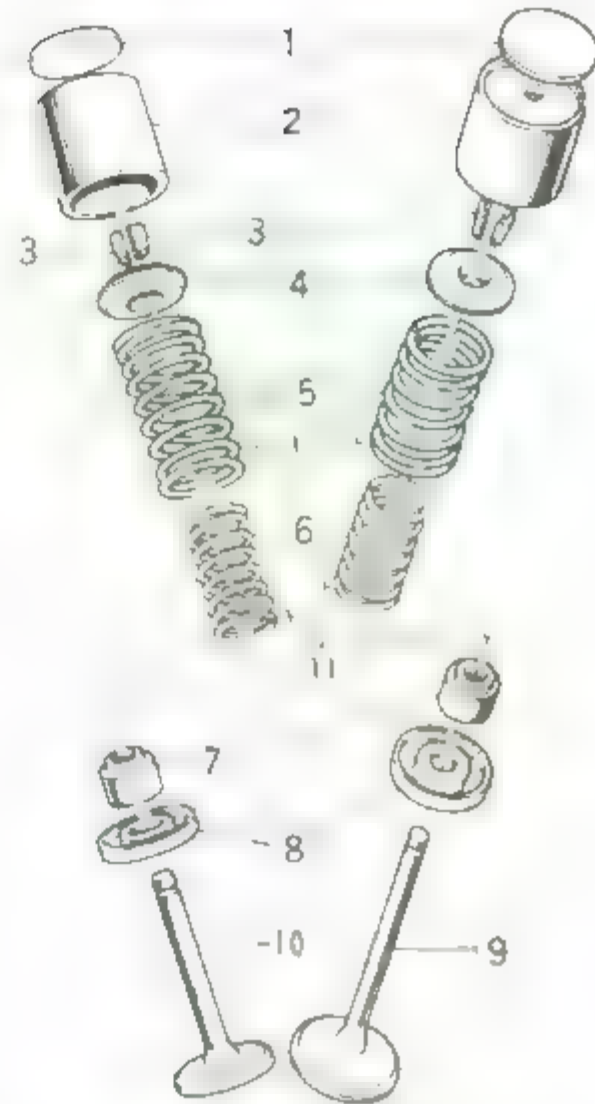
A. Valve Guide Arbor 57001-163

- Valve Guide Installation
- Apply oil to the valve guide outer surface before installation
- Heat the area around the valve guide hole to about 120 ~ 150°C (248 ~ 302 °F)
- Drive the valve guide in from the top of the head using the valve guide arbor (special tool: 57001-163). The circlip stops the guide from going in too far.
- Ream the valve guide with valve guide reamer (special tool) even if the old guide is re-used



A. Valve Guide Reamer 57001-162

- Valve Installation
- Check to see that the valve moves smoothly up and down in the guide.
- Check to see that the valve seats properly in the valve seat. If it does not, repair the valve seat. Check the valve installed height.
- Apply a thin coat of molybdenum disulfide grease to the valve stem before valve installation.
- Install the springs so that the closed coil end is facing toward the valve seat (downwards)



- | | |
|------------------------|---------------------|
| 1 Shim | 7. Oil Seal |
| 2 Valve Lifter | 8. Spring Seat |
| 3 Split Keeper | 9. Valve, Inlet |
| 4 Spring Retainer | 10. Valve, Exhaust |
| 5 Valve Spring, Outer | 11. Closed Coil End |
| 6. Valve Spring, Inner | |

Warp

- Lay a straightedge across the lower surface of the head at several different points, and measure warp by inserting a thickness gauge between the straightedge and the head.
- ★ If warp exceeds the service limit, repair the mating surface. Replace the cylinder head if the mating surface is badly damaged.

4-16 ENGINE TOP END



A. Straightedge

B. Thickness Gauge

Cylinder Head Warp

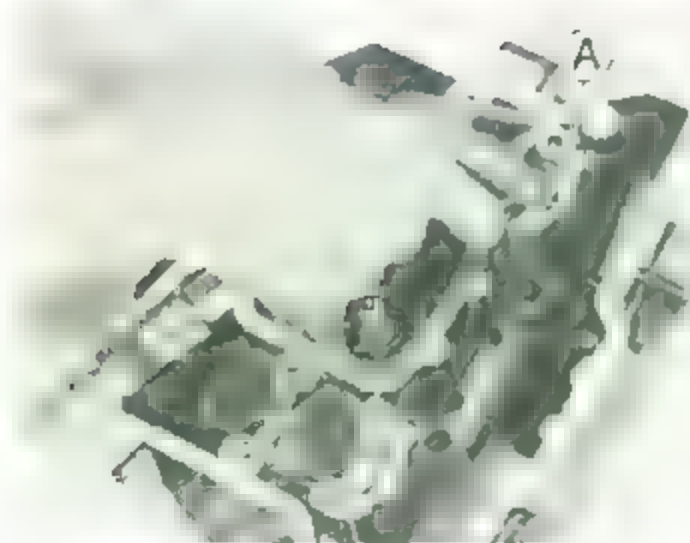
Service Limit: 0.05 mm

Cleaning

- Before installation, blow the oil passages clean with compressed air



A. Oil Passage



A. Oil Passage

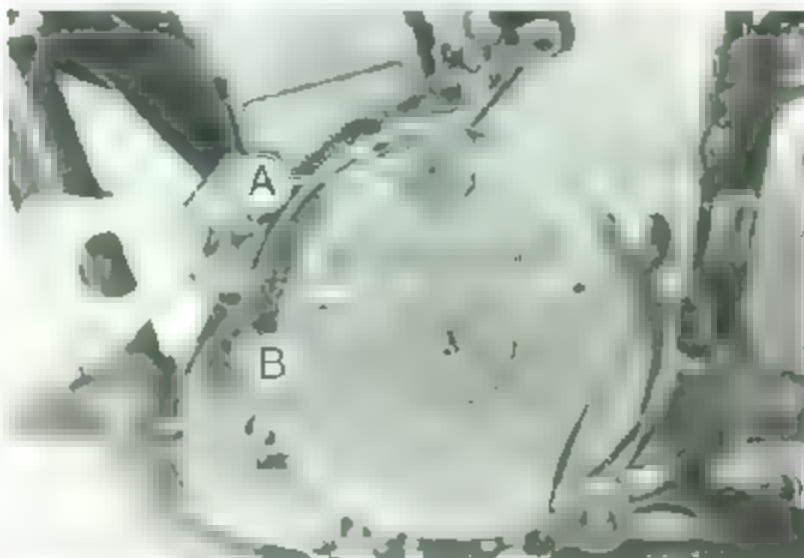
Valves

Clearance Inspection

NOTE

If the engine is hot, wait until the engine cools. Valve clearance must be checked when the engine is cold (room temperature).

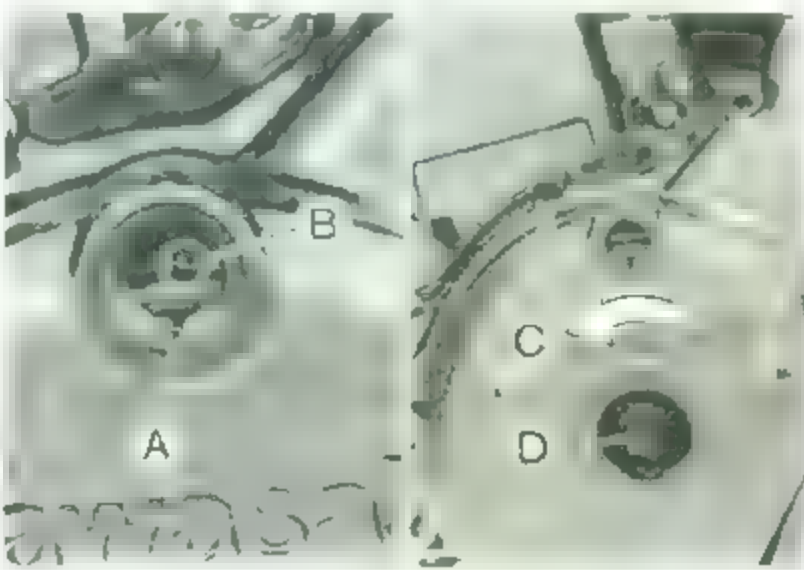
- Remove the cylinder head cover (see Cylinder Head Cover Removal)
- Unscrew the two caps on the alternator cover



A. Upper Cap

B. Lower Cap

- Check the valve clearance when piston is at TDC.
- Using a wrench on the crankshaft rotation bolt, turn the crankshaft counterclockwise while watching the movement of inlet valves (valves to rear). When the valves have just finished opening and closing (moving downwards and returning upwards), turn the crankshaft in the same direction for about another 1/2 turn until the "T" mark on the magneto flywheel is aligned with the notch on the upper hole of the magneto cover.
- At this point, the marks on the camshaft sprockets point forward and line up with the surface of the cylinder head.



A. Notch

B. "T" Mark

C. Normal Direction of Crankshaft Rotation

D. Crankshaft Rotation Bolt

NOTE

○ Check the valve clearance using this method only. Checking the clearance at any other cam position may result in improper valve clearance.

● Measure the clearance between the cam and shim for all four valves.

★ If the valve clearance is incorrect, adjust it.



A. Insert the thickness gauge

Valve Clearance (when cold)

Inlet	:	0.10 ~ 0.20 mm
Exhaust	:	0.15 ~ 0.25 mm

Clearance Adjustment

- To change the valve clearance, remove the chain tens over the camshaft and the shim.
- To select a new shim which brings valve clearance within the specification, refer to the Valve Clearance Adjustment Charts.
- Position the lifter notch so that it faces upwards. This allows the shim to be lifted and removed.



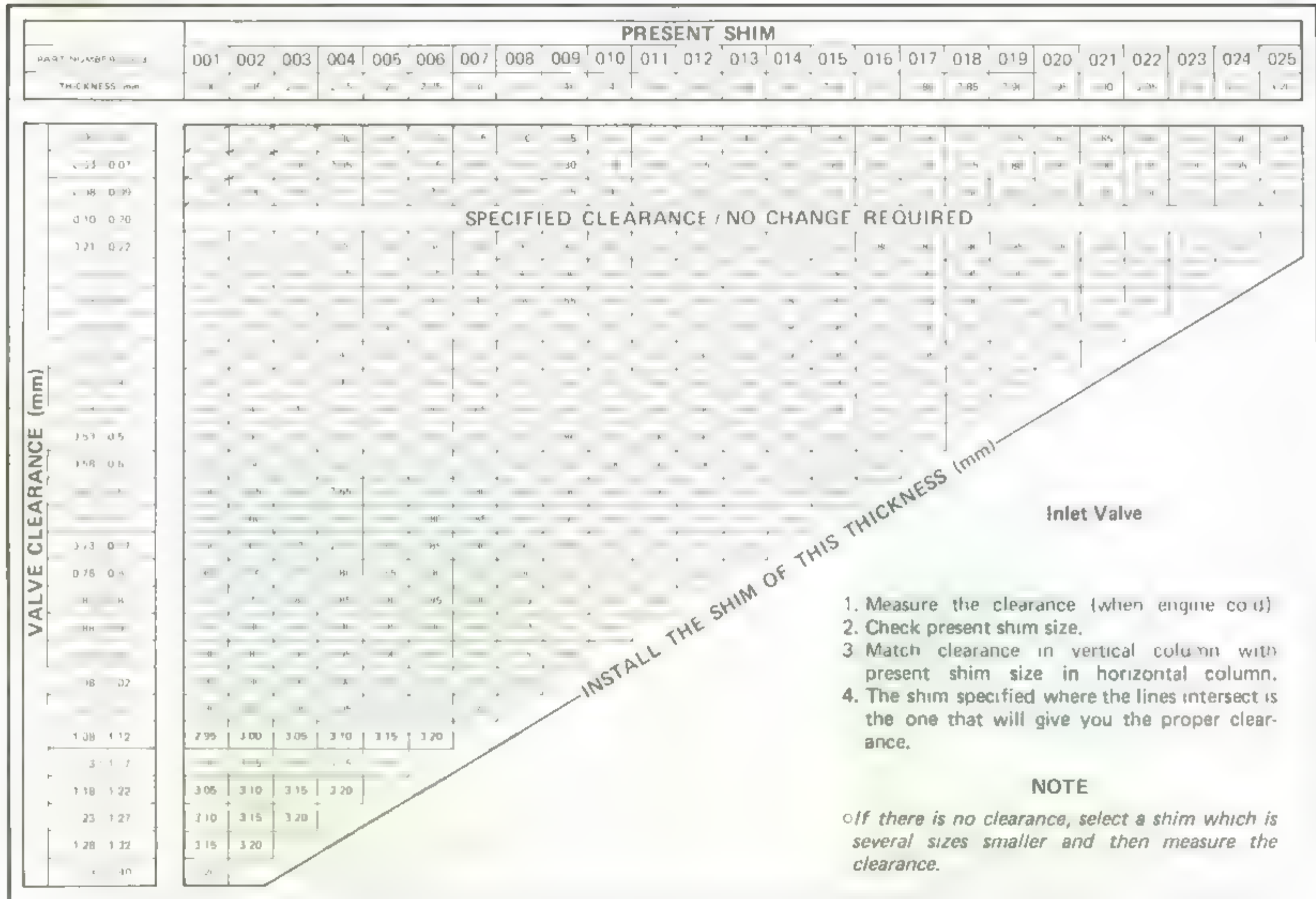
A. Notch

- Install the camshafts. Be sure to time the camshafts properly.
- Remeasure the valve clearance that was adjusted. Re-adjust if necessary.

CAUTION

- Do not put shim stock under the shim. This may cause the shim to pop out at high rpm, causing extensive engine damage.
- Do not grind the shim. This may cause it to fracture, causing extensive engine damage.
- Do not grind the valve stem end to repair it or to permit additional valve clearance. If the valve end is ground, the lifter may contact the spring retainer and/or split keepers during operation, allowing the keeper to loosen. Consequently, the valve may drop into the engine, causing serious damage.

Inlet Valve Clearance Adjustment Chart



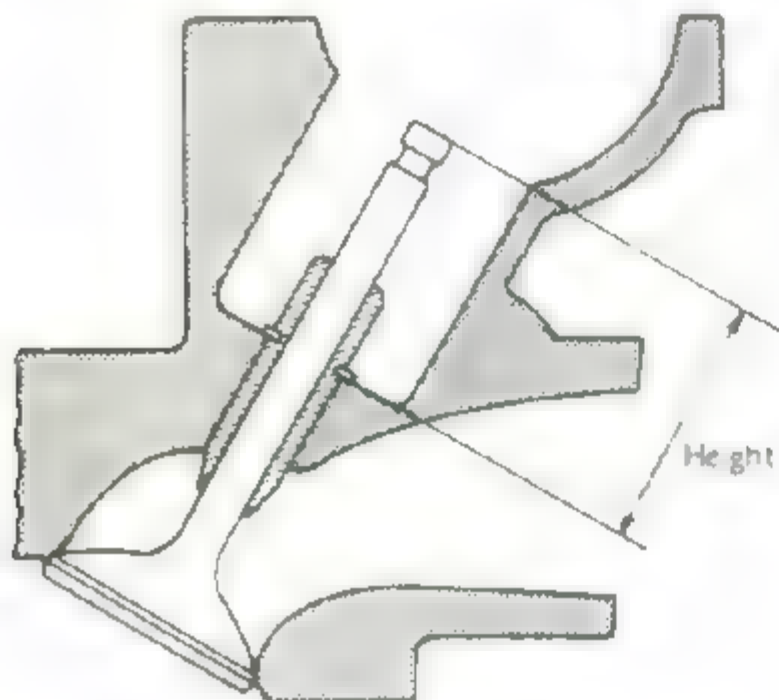
Exhaust Valve Clearance Adjustment Chart

[illegible]

4-20 ENGINE TOP END

Installed Height

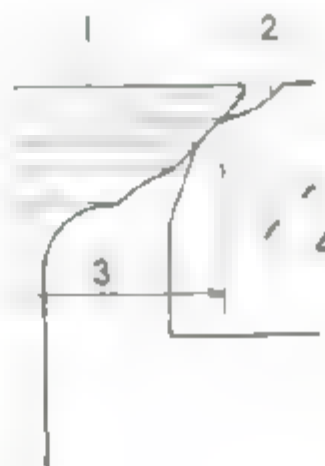
- Install the valve in the cylinder head
- Pushing up on the valve so that it seats firmly in the valve seat, measure the valve installed height with vernier calipers. The valve installed height is the distance from the bottom of the cylinder head after hole to the end of the valve stem



NOTE

○ The valve stem and guide must be in good condition or this check will not be valid

★ If the valve seating pattern is not correct, repair the seat.



1. Valve
2. Valve Seat
3. Seating Surface Outside Diameter
4. Seating Surface Width



Good



Too Wide



Too Narrow



Uneven

Valve Seat Inspection

- Remove the valve.
- Coat valve seat with machinist's dye.
- Push the valve into the guide
- Rotate the valve against the seat with a lapping tool
- Pull the valve out, and check the seating pattern on the valve head. It must be the correct width and even all the way around

Valve Seating Surface Width

- Inlet : 0.8 ~ 1.2 mm
- Exhaust : 0.8 ~ 1.2 mm

- Measure the outside diameter of the seating pattern on the valve seat

Valve Installed Height

Height (mm)		Probable Cause	Recommendation
Inlet	Exhaust		
Less than 37.13	Less than 37.08		<ul style="list-style-type: none"> ● Move valve to deeper cut seat. Remeasure ● Replace valve. Remeasure. ● Replace cylinder head. Remeasure.
37.13 ~ 37.97	37.08 ~ 37.92	Normal, acceptable	<ul style="list-style-type: none"> ● After assembling, check and adjust valve clearance
More than 37.97	More than 37.92	Valve face or seat worn out, or ground excessively.	<ul style="list-style-type: none"> ● Move valve to shallower cut seat. Remeasure ● Replace valve. Remeasure. ● Replace cylinder head. Remeasure.

- ★ If the outside diameter of the valve seating pattern is too large or too small, repair the seat

Valve Seating Surface Outside Diameter

Inlet	: 36.9 ~ 37.1 mm
Exhaust	: 31.9 ~ 32.1 mm

Valve Seat Repair

- Follow the manufacturer's instructions for use of valve seat cutters (special tools)

Use these Cutters

Intake Valve

Seat Cutter	45° - $\phi 30.0$	57001-1117
Outside cutter	32° - $\phi 38.5$	57001-1122
Inside Cutter	60° - $\phi 41.0$	57001-1124

Exhaust Valve

Seat Cutter	45° - $\phi 35.0$	57001-1116
Outside Cutter	32° - $\phi 35.0$	57001-1121
Inside Cutter	60° - $\phi 41.0$	57001-1124

Use this Holder and Bar

Holder - $\phi 70$	57001-1126
Bar	57001-1128

- ★ If the manufacturer's instructions are not available, use the following procedure.

Seat Cutter Operating Cares:

- 1 This valve seat cutter is designed only for valve seat repair. Therefore the cutter must not be used for other purposes.
- 2 Do not drop or hit the valve seat cutter, or the diamond particles may fall off.
- 3 Do not fail to apply engine oil to the valve seat cutter before grinding the seat surface. Also wash off ground particles sticking to the cutter with washing oil.

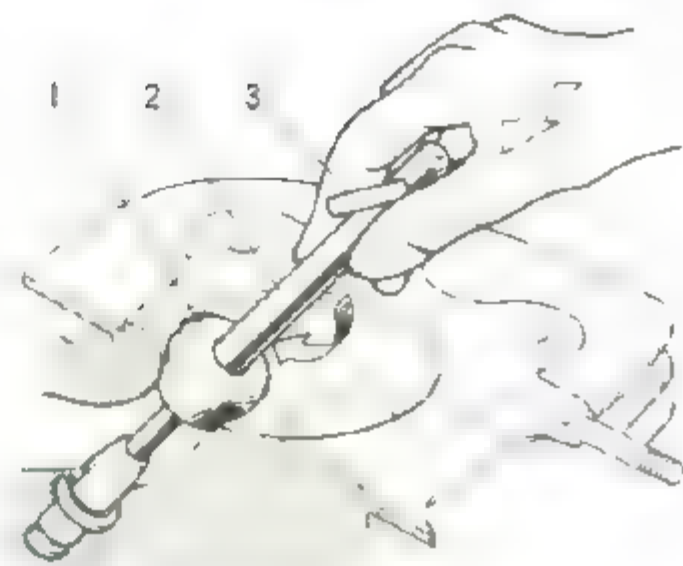
NOTE

- Do not use a wire brush to remove the metal particles from the cutter. It will take off the diamond particles.

- 4 Setting the grinding, apply engine oil to the cutter and during the operation, wash off any ground particles sticking to the cutter with washing oil.

NOTE

- Prior to grinding, apply engine oil to the cutter and during the operation, wash off any ground particles sticking to the cutter with washing oil.



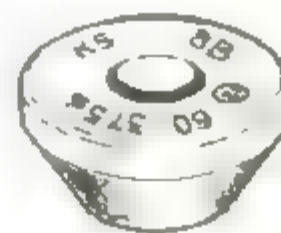
- 1 Cutter
2 Cutter Holder
3 Bar

- 5 After use wash the cutter with washing oil and apply a thin layer of engine oil before storing.

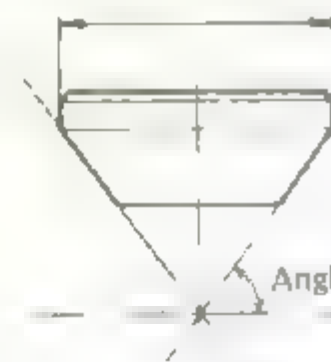
Marks Stamped on the Cutter

The marks stamped on the back of the cutter represent the following:

1	Cutter number, selected from 1 to 12
45°	Cutter angle
24.5 ϕ	Outer diameter of cutter
KS00	Manufactured lot number



Outer Diameter of Cutter



Angle of Cutter

Operating Procedures:

- Clean the seat area carefully.
- Coat the seat with machinist's dye.
- Fit a 45° cutter to the holder and slide it into the valve guide.
- Press down lightly on the handle and turn it right or left. Grind the seating surface only until it is smooth.

4-22 ENGINE TOP END

CAUTION

○ Do not grind the seat too much. Overgrinding will reduce valve clearance by sinking the valve into the head. If the valve sinks too far into the head, it will be impossible to adjust the clearance, and the cylinder head must be replaced.

● Measure the outside diameter of the seating surface with a vernier caliper.

★ If the outside diameter of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.

★ If the outside diameter of the seating surface is too large, make the 32° grind described below.

★ If the outside diameter of the seating surface is within the specified range, measure the seat width as described below.

● Grind the seat at a 32° angle until the seat O.D. is within the specified range.

○ To make the 32° grind, fit a 32° cutter to the holder, and slide it into the valve guide.

○ Turn the holder one turn at a time while pressing down very lightly. Check the seat after each turn.

CAUTION

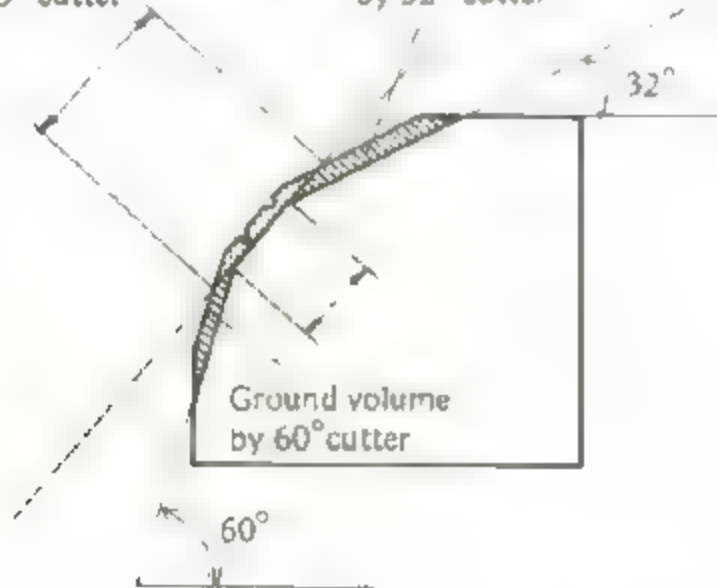
○ The 32° cutter removes material very quickly. Check the seat outside diameter frequently to prevent over grinding.

○ After making the 32° grind, return to the seat O.D. measurement step above.

Widened width of engagement by machining with 45° cutter

Ground volume by 32° cutter

Ground volume by 60° cutter



● To measure the seat width, use a vernier caliper to measure the width of the 45° angle portion of the seat at several places around the seat.

★ If the seat width is too narrow, repeat the 45° grind until the seat is slightly too wide, and then return to the seat O.D. measurement step above.

★ If the seat width is too wide, make the 60° grind described below.

★ If the seat width is within the specified range, lap the valve to the seat as described below.

● Grind the seat at a 60° angle until the seat width is within the specified range.

○ To make the 60° grind, fit a 60° cutter to the holder, and slide it into the valve guide.

○ Turn the holder, while pressing down lightly.

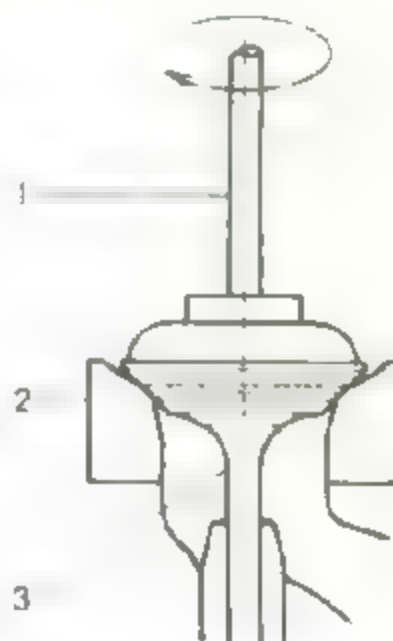
○ After making the 60° grind, return to the seat width measurement step above.

● Lap the valve to the seat, once the seat width and O.D. are within the ranges specified above.

○ Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.

○ Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.

○ Repeat the process with a fine grinding compound.



- 1 Lapper
- 2 Valve Seat
- 3 Valve

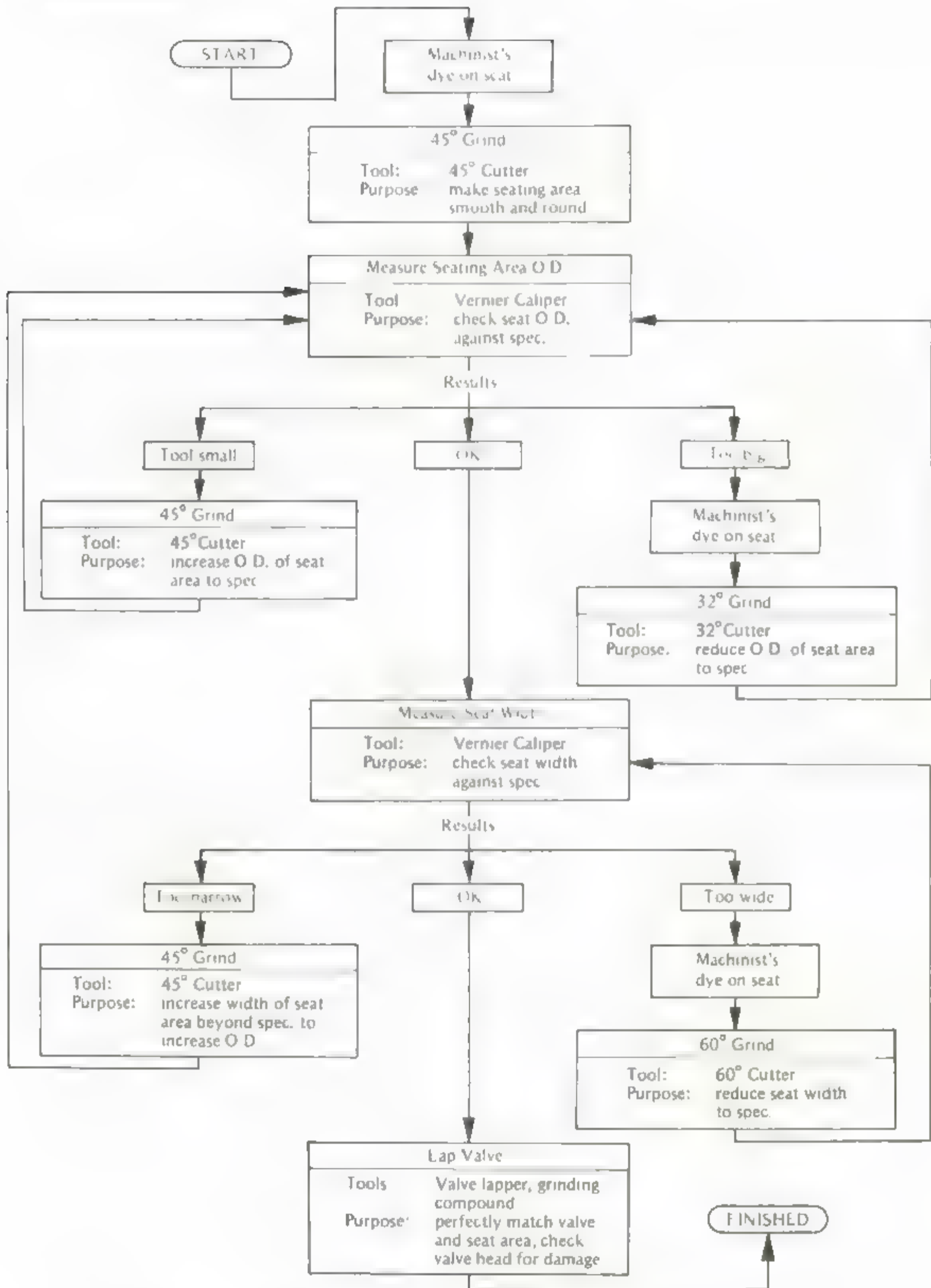
● The seating area should be marked about in the middle of the valve face.

★ If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.

● Be sure to remove all grinding compound before assembly.

● When the engine is assembled, be sure to adjust the valve clearances (see Valve Clearance Adjustment).

Valve Seat Repair



4-24 ENGINE TOP END

Measuring Valve-to-Guide Clearance (Wobble Method)

If a small bore gauge is not available, inspect the valve guide wear by measuring the valve to valve guide clearance with the wobble method, as indicated below.

- Insert a new valve into the guide so that the end of the stem is flush with the end of the guide.
- Set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface.
- Move the stem back and forth to measure valve/valve guide clearance.
- Repeat the measurement in a direction at a right angle to the first.

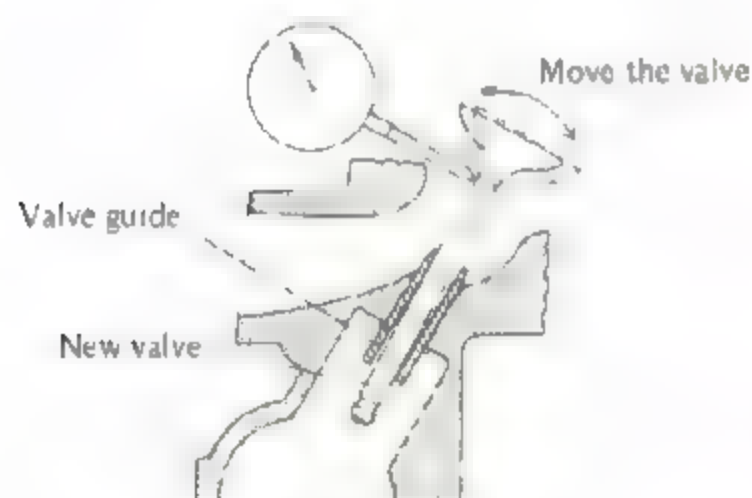
★ If the reading exceeds the service limit, replace the guide.

NOTE

○ The reading is not actual valve/valve guide clearance because the measuring point is above the guide.

Valve/Valve Guide Clearance (Wobble Method)

	Standard	Service Limit
Inlet	0.04 ~ 0.11 mm	0.24 mm
Exhaust	0.05 ~ 0.12 mm	0.24 mm



Cylinder, Piston

Cylinder Removal

- Remove the cylinder head.
- Remove the mounting bolts, and slide off the starter motor.
- Remove the main oil pipe mounting bolt.
- Pull off the water pump hose upper end.
- Pull out the chain guide holder and guide.
- Remove the cylinder bolt.
- Remove the cylinder nuts.



A. Cylinder Bolt



A. Cylinder Nuts

- Lift off the cylinder so as not to damage the main oil pipe.

NOTE

○ Tap lightly around the base of the cylinder with a rubber mallet.

- Remove the cylinder base gasket.

Cylinder Installation Notes

- Replace the cylinder base gasket with a new one
- Apply engine oil to the piston surface, piston rings and cylinder bore
- Install the cylinder so as not to damage the main oil pipe
- Tighten the following to the specified torque in following order
 - 1 Cylinder Nuts
 - 2 Cylinder Bolt
- After setting the chain guide into the crankcase and cylinder concavity securely, fit the guide holder into the cylinder concavity securely

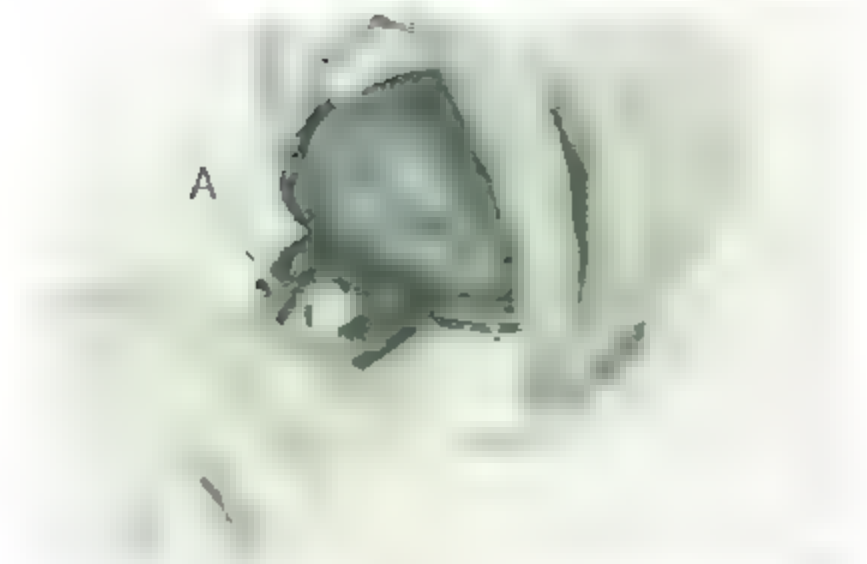
Piston Removal

- Remove the cylinder
- Stuff a clean cloth into the crankcase opening around the connecting rod so that no parts will fall into the crankcase
- Remove one of the piston pin snap rings with needle nose pliers
- Remove the piston by pushing the piston pin out the side from which the snap ring was removed. Use a piston pin puller assembly and adapter (special tools), if the pin is tight



A Piston Pin Puller Assembly: 57001-910
B Adapter: 57001-1211

- Remove the top and second rings with piston ring pliers (special tool). If the special tool is not available, carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring to remove it.
- Remove the 3-piece oil ring with your thumbs in the same manner



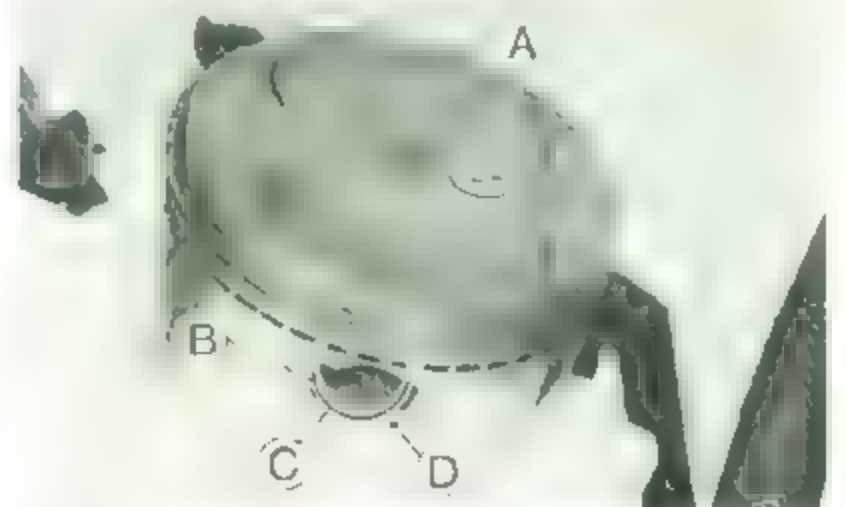
A Piston Ring Pliers: 57001-115

Piston Installation Notes

- The arrow on the top of the piston must point toward the front
- When installing a piston pin snap ring, compress it only enough to install it and no more

CAUTION

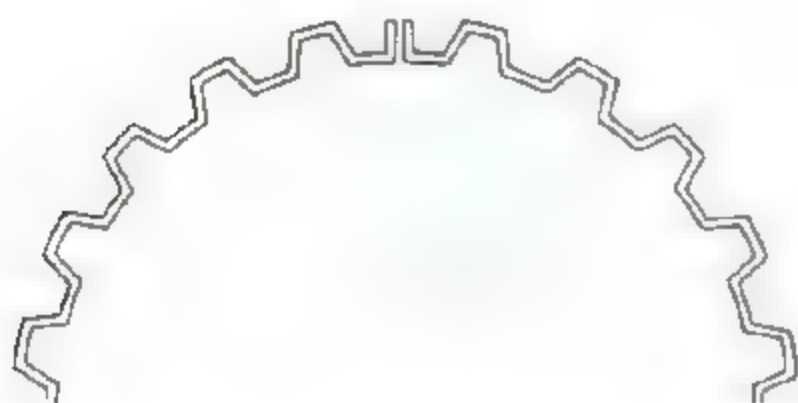
- Do not reuse snap rings, as removal weakens and deforms them. They could fall out and score the cylinder wall
- Fit a new piston pin snap ring into the side of the piston so that the ring opening does not coincide with the notch in the edge of the piston pin hole



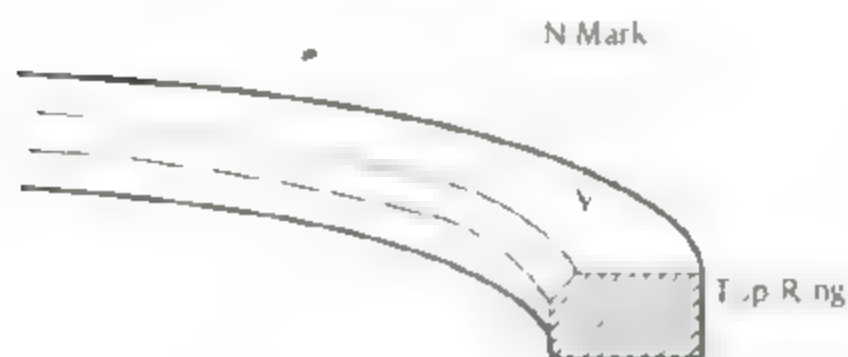
A Arrow
B Snap Ring
C Ring Opening
D Notch

- Oil Ring Installation.
 - First install the expander in the piston oil ring groove so that the expander ends but together, never overlap
 - Install the upper and lower steel rails. There is no UP or DOWN to the rails. They can be installed either way.

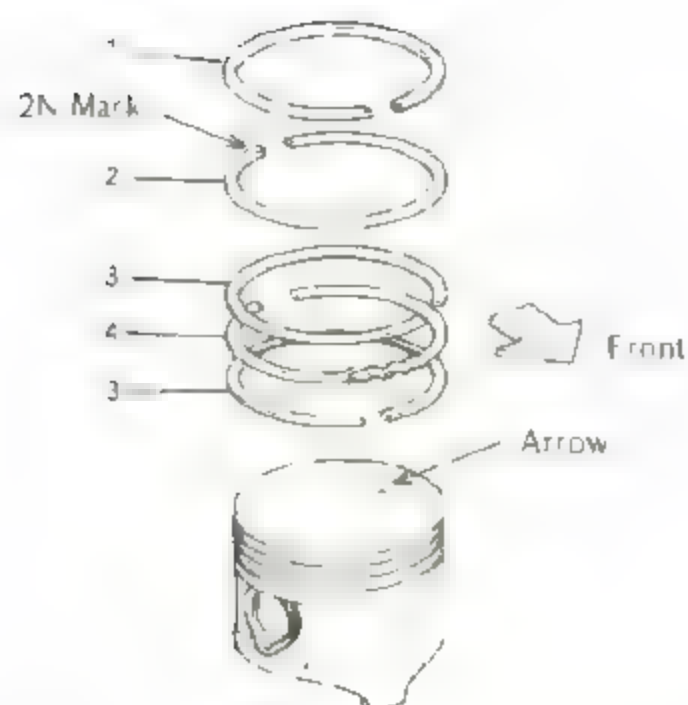
4-26 ENGINE TOP END



- Do not mix up the top and second rings. The top and second rings are not symmetrical and must be installed with the marked side facing up.



- Position each piston ring so that the opening in the top ring and oil ring steel rails are facing forwards, and the second ring and oil ring expander openings face the rear. The openings of the oil ring steel rails must be about $30^{\circ} \sim 40^{\circ}$ of angle from the opening of the top ring to either side.



- 1 Top Ring
- 2 Second Ring
- 3 Steel Rail, Oil Ring
- 4 Expander, Oil Ring

Piston Ring, Piston Ring Groove Wear

- Check for uneven groove wear by inspecting the ring seating
- ★ The rings should fit perfectly parallel to the groove surfaces. If not, the piston must be replaced
- With the piston rings in their grooves, make several measurements with a thickness gauge to determine piston ring/groove clearance

Piston Ring/Groove Clearance

	Standard	Service Limit
Top	0.03 ~ 0.07 mm	0.17mm
Second	0.02 ~ 0.06 mm	0.16 mm



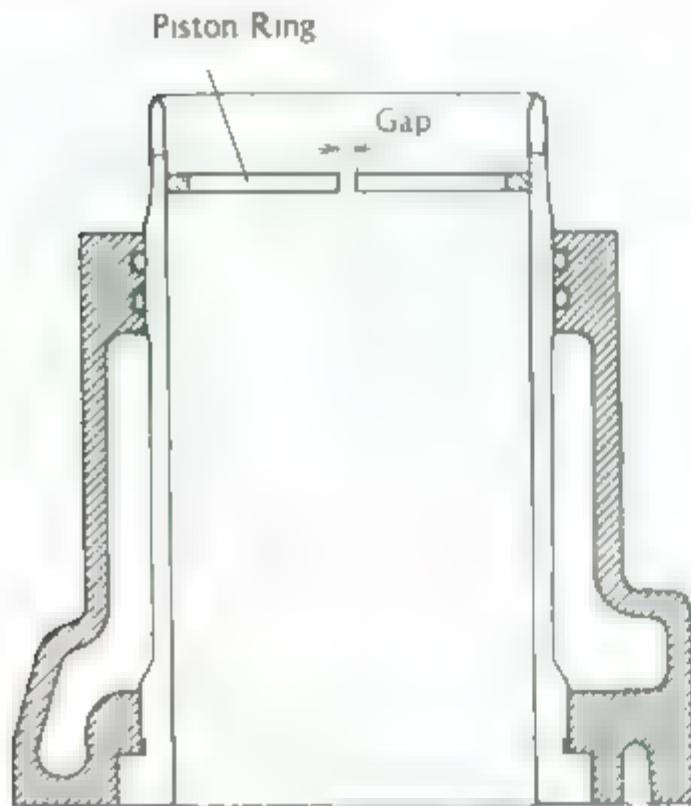
A. Thickness Gauge

Piston Ring End Gap

- Place the piston ring inside the cylinder, using the piston to locate the ring squarely in place. Set it close to the bottom of the cylinder, where cylinder wear is low.
- Measure the gap between the ends of the ring with a thickness gauge.

Piston Ring End Gap

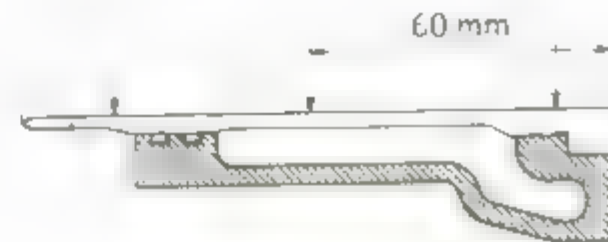
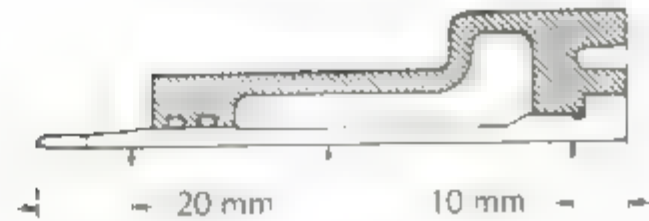
	Standard	Service Limit
Top	0.2 ~ 0.4 mm	0.7 mm
Second	0.2 ~ 0.4 mm	0.7 mm

**Cylinder Inside Diameter**

- Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-back measurement at each of the 3 locations (total of 6 measurements) shown in the figure.
- ★ If any of the cylinder inside diameter measurements exceeds the service limit, the cylinder will have to be bored to oversize and then honed.

Cylinder Inside Diameter

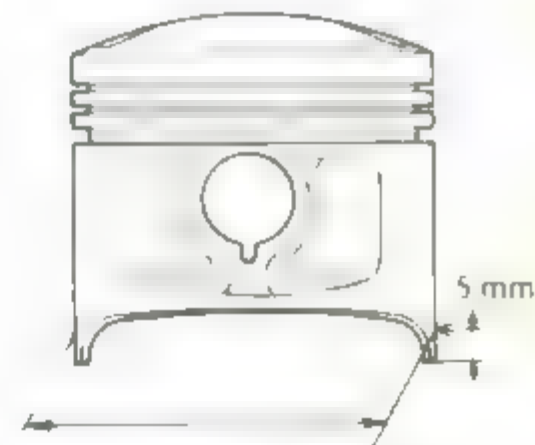
Standard:	KL650-B1	100.000 ~ 100.012 mm
	KL500-B1	89.000 ~ 89.012 mm
		and less than 0.01 mm difference between any two measurements
Service Limit:	KL650-B1	100.10 mm
	KL500-B1	89.10 mm
		or more than 0.05 mm difference between any two measurements

**Piston Diameter**

- Measure the outside diameter of each piston 5 mm up from the bottom of the piston at a right angle to the direction of the piston pin.
- ★ If the measurement is under the service limit, replace the piston.

Piston Diameter

Standard:	KL650-B1	99.942 ~ 99.957 mm
	KL500-B1	88.942 ~ 88.957 mm
Service Limit:	KL650-B1	99.80 mm
	KL500-B1	88.80 mm

**Boring, Honing**

When boring and honing a cylinder, note the following:

- There are two sizes of oversize pistons available. Oversize pistons require oversize rings.
- | Oversize Pistons and Rings | |
|----------------------------|----------|
| 0.5 mm | Oversize |
| 1.0 mm | Oversize |
- Before boring a cylinder, first measure the exact diameter of the oversize piston, and then, according to the standard clearance in the Specifications, determine the rebore diameter. However, if the amount of boring necessary would make the inside diameter greater than 1.0 mm, the cylinder block must be replaced.

4-28 ENGINE TOP END

- Cylinder inside diameter must not vary more than 0.01 mm at any point.
- Be wary of measurements taken immediately after boring since the heat affects cylinder diameter.
- In the case of a rebored cylinder and oversize piston, the service limit for the cylinder is the diameter that the cylinder was bored to plus 0.1 mm and the service limit for the piston is the oversize piston original diameter minus 0.15 mm. If the exact figure for the rebored diameter is unknown, it can be roughly determined by measuring the diameter at the base of the cylinder.

Exhaust Pipe, Muffler

Exhaust Pipe Removal

- Remove the following.
 - Upper Fairing
 - Lower Fairing
 - Rear Brake Reservoir Cover
- Loosen the clamp bolt
- Remove the mounting bolt
- Remove the exhaust pipe holder nuts
- Pull off the exhaust pipe to the frontward



A Clamp Bolt

B Mounting Bolt



A Holder Nuts

Muffler Removal

- Remove the following.
 - Right Side Cover
 - Rear Brake Reservoir Cover
- Loosen the clamp bolt
- Remove the mounting bolts and pull off the muffler to the rearward



A Mounting Bolts

Exhaust Pipe, Muffler Installation Notes

- Check the exhaust gasket for signs of damage. If necessary, replace it with a new one
- Thoroughly warm up the engine, wait until the engine cools down, and then retighten the clamp bolt and holder nuts

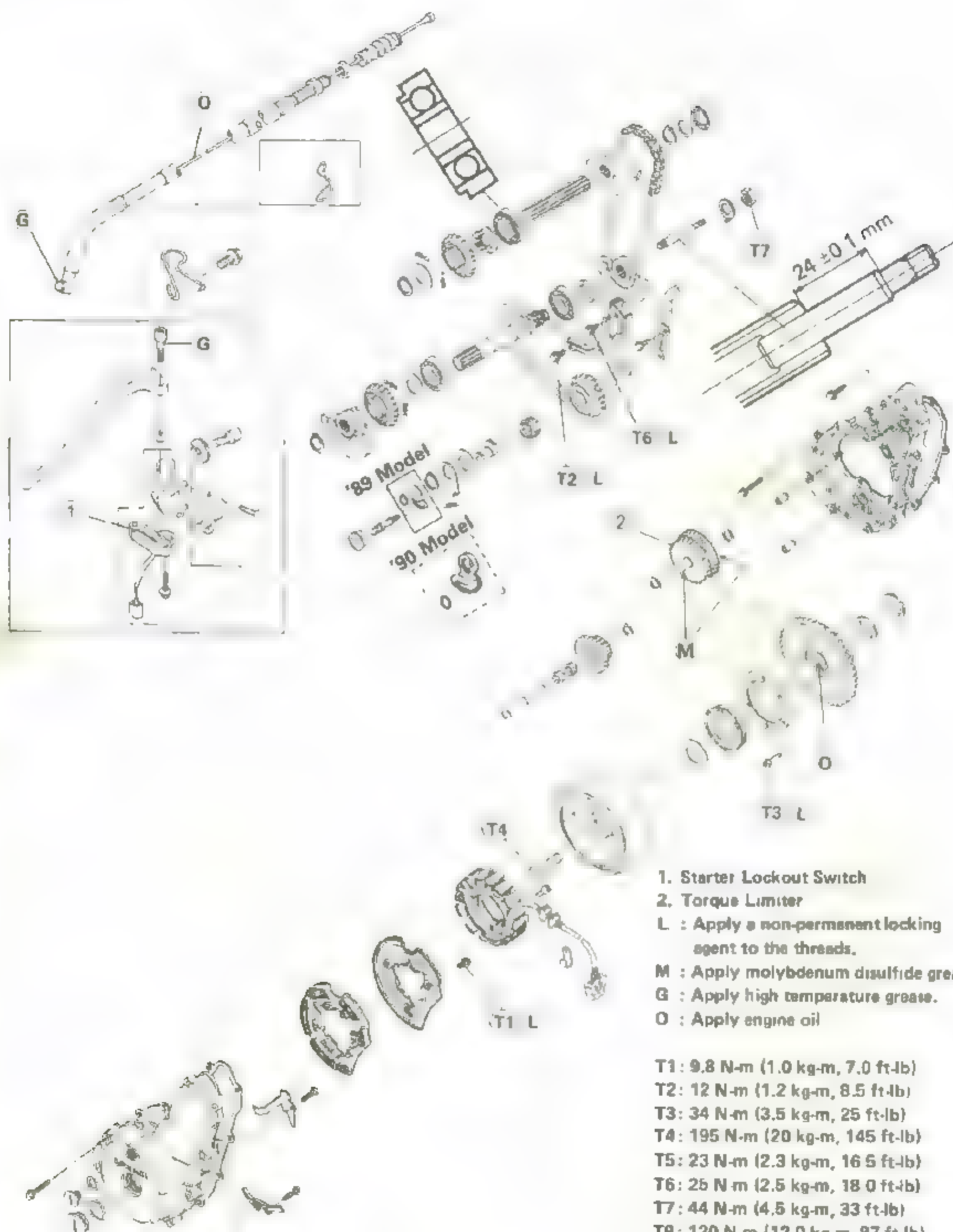
Engine Right Side / Left Side

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5-2 ENGINE RIGHT SIDE / LEFT SIDE

Exploded View



1. Starter Lockout Switch

2. Torque Limiter

L : Apply a non-permanent locking agent to the threads.

M : Apply molybdenum disulfide grease.

G : Apply high temperature grease.

O : Apply engine oil

T1: 9.8 N-m (1.0 kg-m, 7.0 ft-lb)

T2: 12 N-m (1.2 kg-m, 8.5 ft-lb)

T3: 34 N-m (3.5 kg-m, 25 ft-lb)

T4: 195 N-m (20 kg-m, 145 ft-lb)

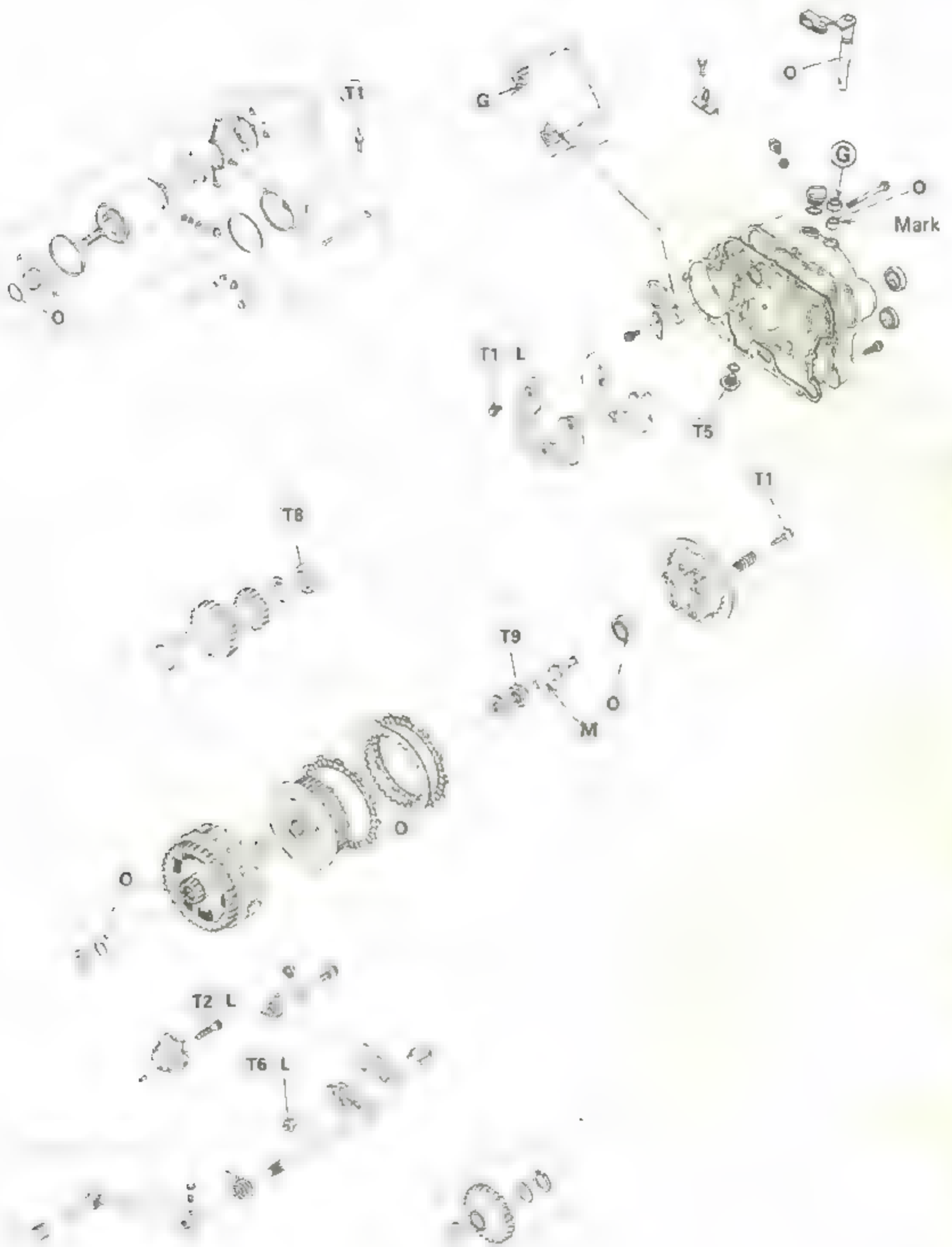
T5: 23 N-m (2.3 kg-m, 16.5 ft-lb)

T6: 25 N-m (2.5 kg-m, 18.0 ft-lb)

T7: 44 N-m (4.5 kg-m, 33 ft-lb)

T8: 120 N-m (12.0 kg-m, 87 ft-lb)

T9: 130 N-m (13.5 kg-m, 98 ft-lb)



5-4 ENGINE RIGHT SIDE / LEFT SIDE

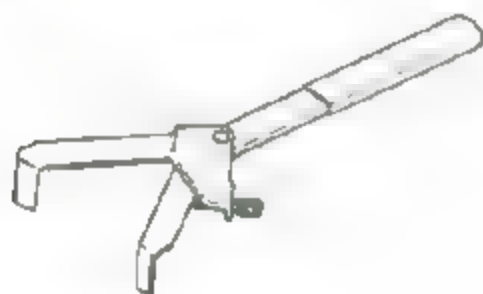
Specifications

Item	Standard	Service Limit
Clutch:		
Clutch lever free play	2 ~ 3 mm	
Clutch spring free length	34.2 mm	33.1 mm
Friction plate thickness	2.9 ~ 3.1 mm	2.8 mm
Friction and steel plate warp	Not more than 0.2 mm	0.3 mm
Balancer Mechanism:		
Balancer chain 20-link length	190.5 ~ 190.9 mm	193.4 mm

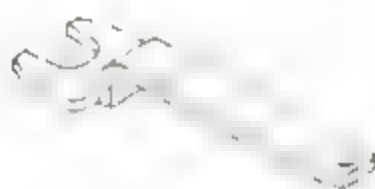
Special Tools

Outside Circlip Pliers: 57001-144

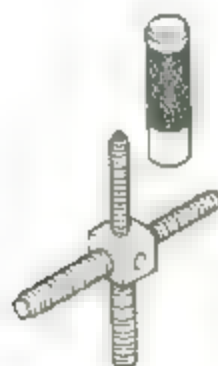
Clutch Holder: 57001-1243



Rotor Holder: 57001-1184



Rotor Puller: 57001-1218



Right Engine Cover

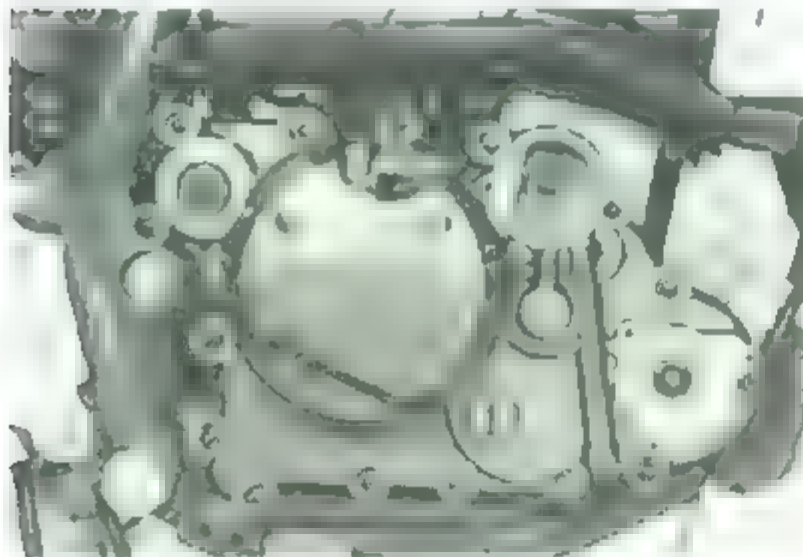
Removal

- Remove
 - Engine Oil (drain)
 - Fa rings
 - Coolant (drain)
 - Brake Pedal and Spring
 - Right Footpeg
 - Left Handguard
 - Clutch Cable Upper and Lower Ends
 - Oil Filter
 - Water Pump Cover (turn up)
 - Impeller
- Turn the clutch release lever toward the rear and free the release shaft from the clutch spring plate pusher

CAUTION

○ Do not remove the clutch release shaft for clutch cover removal. Cover release shaft removal damages the oil seal in the clutch cover necessitating oil seal replacement

- Remove the cover bolts, and take off the cover



A. Cover Bolts

Installation Notes

- Before installation, turn the clutch release lever toward the rear
- After installation, adjust the clutch

Clutch

Due to friction plate wear and clutch cable stretch over a long period of use, the clutch must be adjusted in accordance with the Periodic Maintenance Chart

WARNING

○ To avoid a serious burn, never touch the engine or exhaust pipe during clutch adjustment.

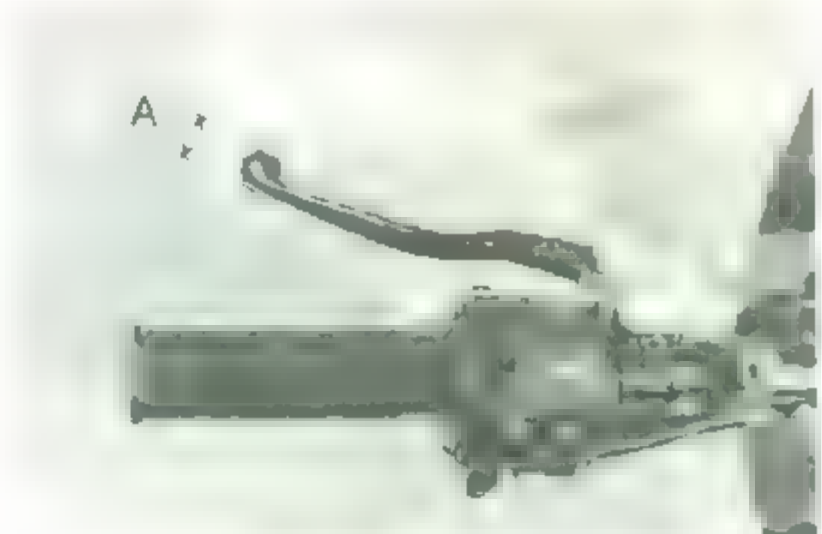
Adjustment Check

- Remove the handguard
- Pull the clutch lever just enough to take up the free play
- Measure the gap between the lever and the lever bracket



A. Clutch Lever Free Play: 2 ~ 3 mm

- When checking the clutch lever play without the handguard removal, check the lever play at the lever end



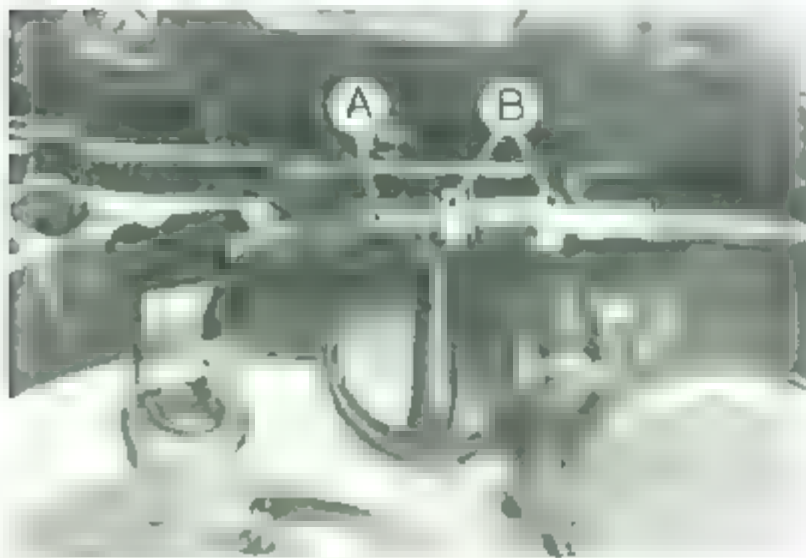
A. Clutch Lever Play (at lever end) 10 ~ 15 mm

★ If the gap is too wide, the clutch may not release fully
 If the gap is too narrow, the clutch may not engage fully. In either case, adjust the clutch

5-6 ENGINE RIGHT SIDE / LEFT SIDE

Adjustment

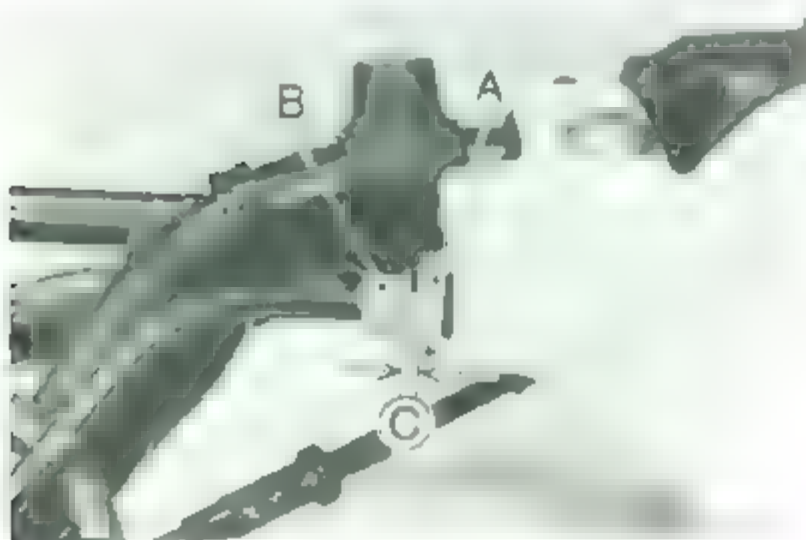
- Slide back the dust cover at the clutch cable lower end
- Loosen both adjusting nuts at the right engine cover as far as they will go



A. Dust Cover

B. Adjusting Nuts

- Loosen the knurled locknut at the clutch lever
- Turn the adjuster so that 5 ~ 6 mm of threads are visible.



A. Knurled Locknut

B. Adjuster

C. 5 ~ 6 mm

- Pull the clutch cable tight and tighten the adjusting nuts against the bracket.



A. Clutch Cable

B. Pull Tight

C. Adjusting Nuts

- Slip the rubber dust cover back into place
- Turn the adjuster at the clutch lever until the free play is correct
- Tighten the knurled locknut at the clutch lever

NOTE

○ Be sure that the outer cable end at the clutch lever is fully seated in the adjuster at the clutch lever, or it could slip into the place later, creating enough cable play to prevent clutch disengagement.

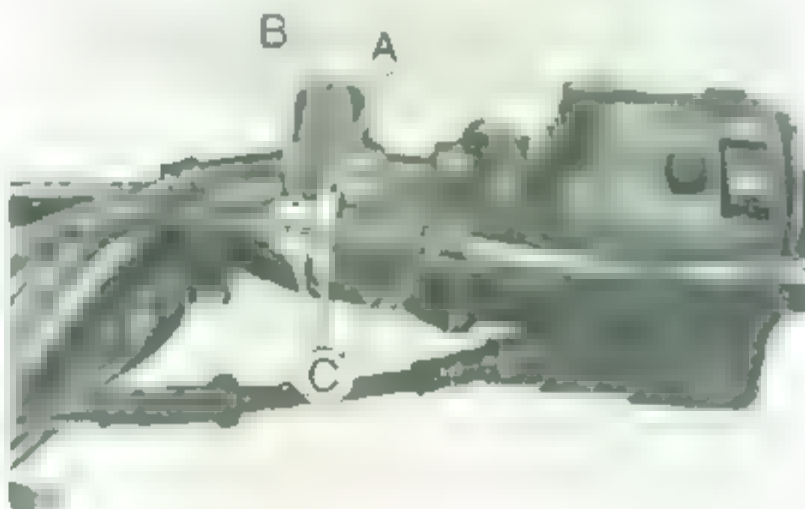
- After the adjustment, start the engine and check that the clutch does not slip and that it releases properly

Release Shaft Removal

CAUTION

○ Do not remove the clutch release shaft unless it is absolutely necessary. If removed, you must replace the oil seal with a new one

- Slide the dust cover at the clutch cable lower end out of place
- Loosen the nuts, and slide the lower end of the clutch cable to give the cable plenty of play
- Remove the left handguard.
- Loosen the knurled locknut at the clutch lever, and screw in the adjuster
- Line up the slots in the clutch lever, knurled locknut and adjuster, and then free the cable from the lever.

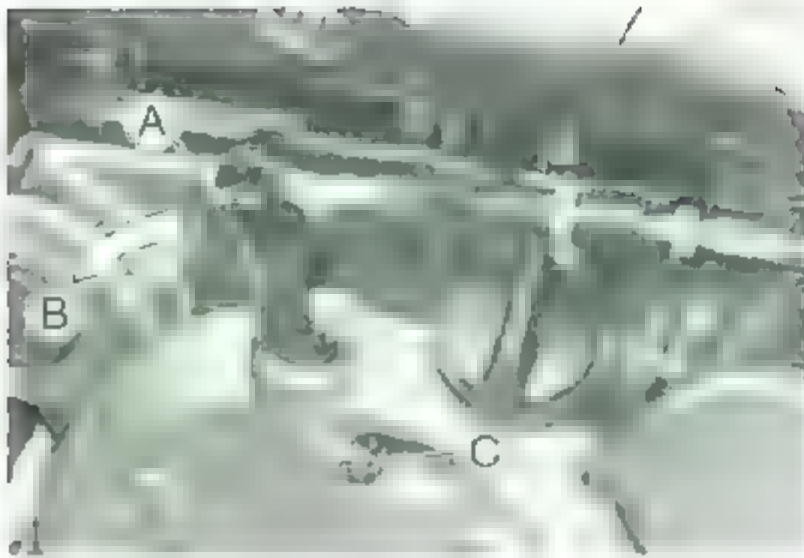


A. Knurled Locknut

B. Adjuster

C. Slot

- Free the clutch inner cable tip from the clutch release lever
- Turn the release lever toward the rear as shown in the figure.



A Release Lever
B Rear
C Positioning Bolt

- Remove the positioning bolt
- Pull the lever and shaft assembly out of the clutch cover

Release Shaft Installation

CAUTION

- Install a new oil seal always when removing the clutch release shaft

- Apply high temperature grease to the oil seal lips on the upper ridge of the clutch cover
- Apply oil to the bearing in the hole of the clutch cover
- Apply oil to the release shaft
- Turning the release lever toward the rear, insert the release shaft straight into the upper hole of the clutch cover

CAUTION

- When inserting the release shaft, be careful not to remove the spring of the oil seal.

- Install the positioning bolt.
- Turn the release lever clockwise until it becomes hard to turn.
- The release lever should have proper clearance and angle as shown



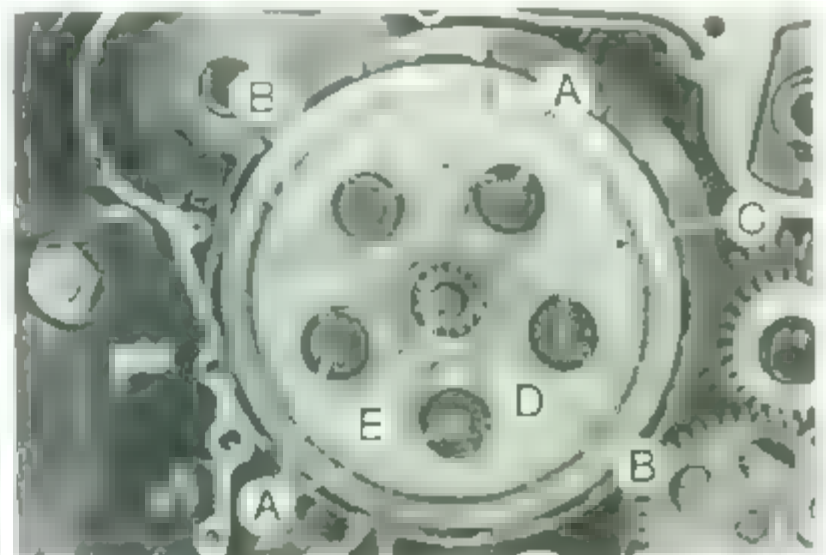
A 1 ~ 3 mm



A 80° ~ 90°

Removal

- Remove the right engine cover
- Remove the clutch spring bolts, washers and springs
- Remove the clutch spring plate with the thrust ball bearing and pusher
- Remove the friction plates and steel plates

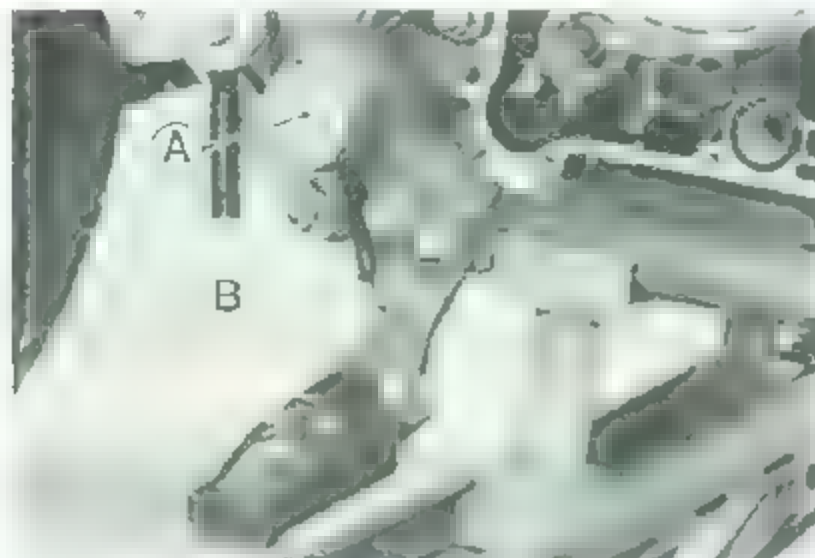


A Clutch Spring Bolt
B Washer
C Clutch Spring Plate
D Thrust Ball Bearing
E Plate Pusher

- Using the clutch holder (special tool), remove the clutch hub nut

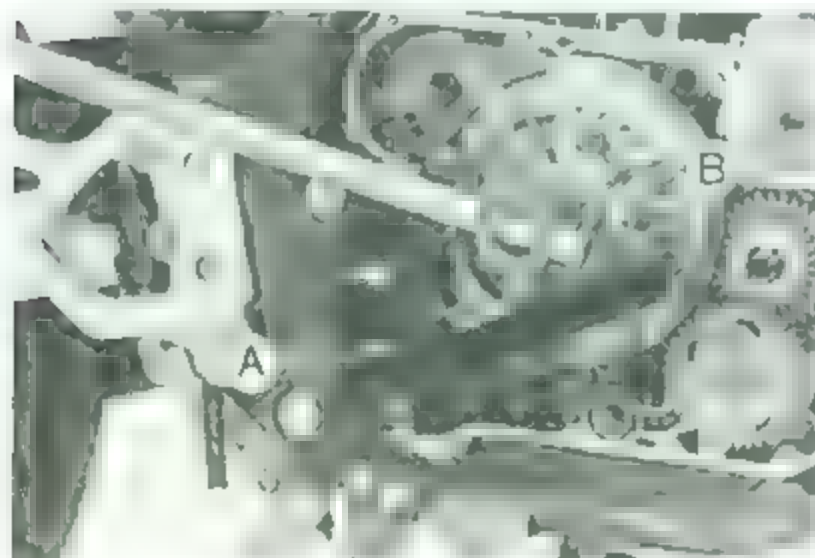
5 8 ENGINE RIGHT SIDE / LEFT SIDE

- Before using the special tool, remove the frame pipe cap and install the right footpeg with turning it upside down as a stopper for the special tool.



A. Cap

B. Footpeg



A. Clutch Holder 57001-1243

B. Hub Nut

- Remove the following out of the drive shaft:
 - Washer
 - Clutch Hub
 - Thrust Washer
 - Clutch Housing and Bushing
 - Spacer

Installation Notes

- Discard the used clutch hub nut, and install a new nut.
- Install the clutch hub nut with the projected side facing outward.
- Install the clutch holder (special tool: 57001-1243) to keep the clutch hub from turning and tighten the clutch hub nut to the specified torque (see Exploded View).
- After torquing, caulk the nut.
- Install the friction plates and steel plates, starting with a friction plate and alternating them.

CAUTION

- If new dry steel plates and friction plates are installed, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.

- Apply engine oil to the thrust ball bearing.
- Apply molybdenum disulfide grease to the rubbing portion of clutch spring plate pusher.
- Tighten the clutch spring bolts to the specified torque (see Exploded View).

Friction Plate Wear, Damage Inspection

- Visually inspect the friction plates to see if they show any signs of seizure, overheating, or uneven wear.
- ★ If any plates show signs of damage, replace the friction plates and steel plates as a set.



A. Friction Plate

Friction Plate Thickness

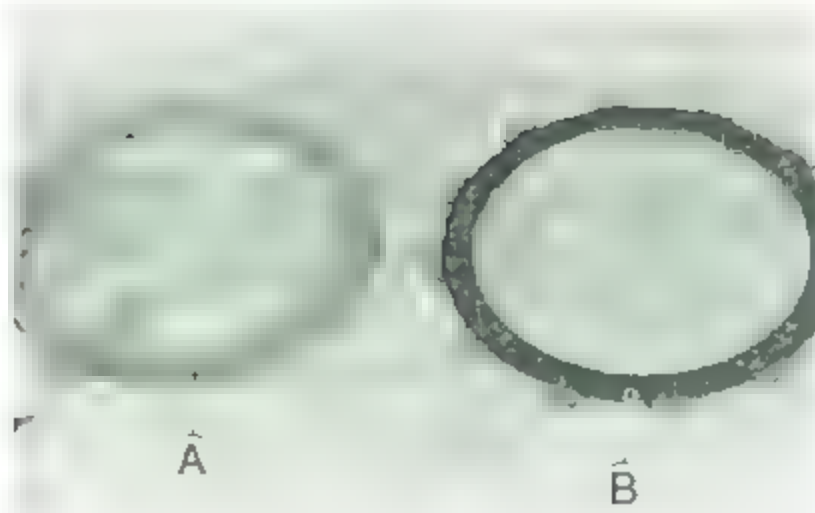
Standard:	2.9 ~ 3.1 mm
Service Limit:	2.8 mm

Friction and Steel Plate Warp Inspection

- Place each friction plate or steel plate on a surface plate, and measure the gap between the surface plate and each friction plate or steel plate. The gap is the amount of friction or steel plate warp.
- ★ If any plate is warped over the service limit, replace it with a new one.

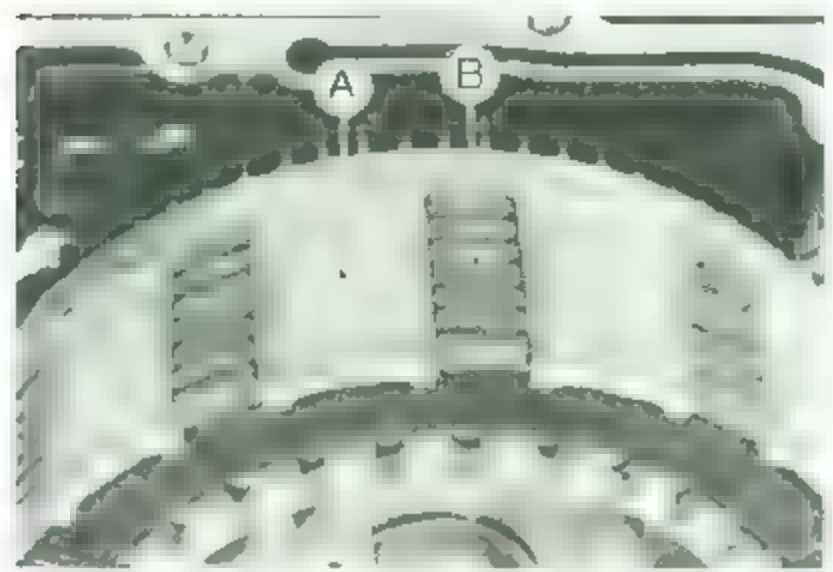
Friction and Steel Plate Warp

Standard:	Not more than 0.2 mm
Service Limit:	0.3 mm



A Steel Plate

B Friction Plate



A Clutch Housing Finger

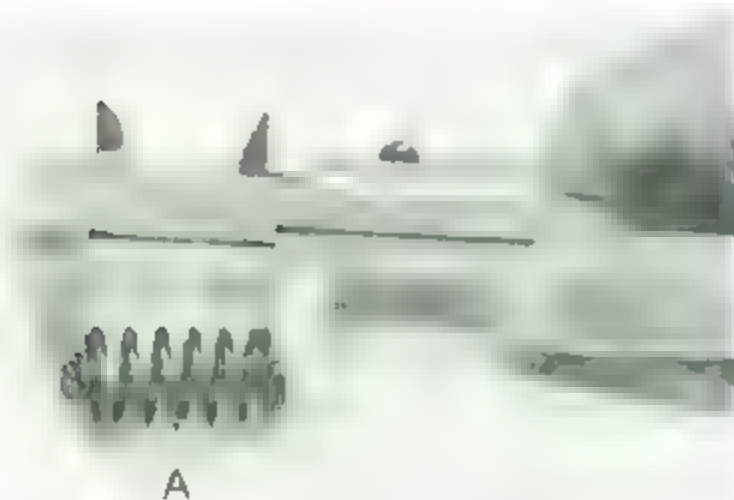
B Friction Plate Tang

Clutch Spring Free Length Measurement

Clutch Spring Free Length

Standard: 34.2 mm

Service Limit: 33.1 mm



A Clutch Spring

Clutch Housing Finger Inspection

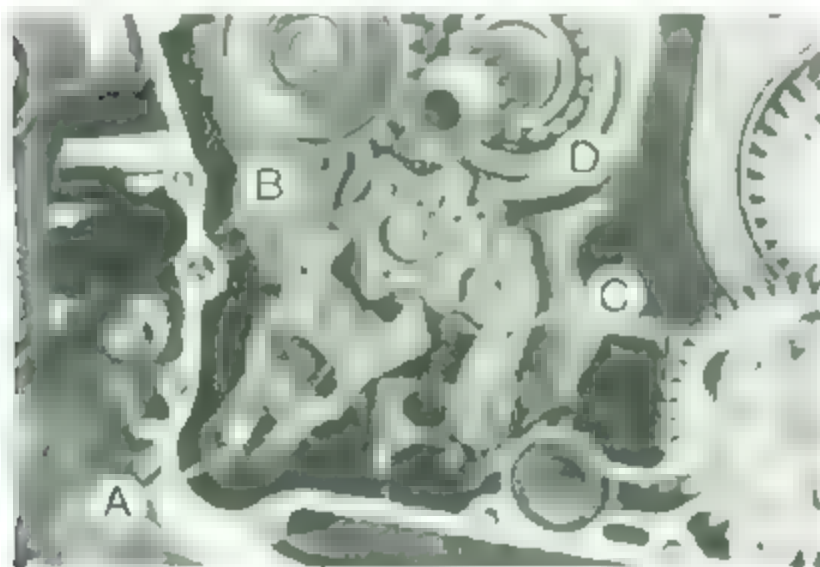
- Visually inspect the fingers of the clutch housing where the tangs of the friction plates hit them
- ★ If they are badly worn or if there are grooves cut where the tangs hit, replace the housing. Also, replace the friction plates if their tangs are damaged.

5-10 ENGINE RIGHT SIDE / LEFT SIDE

External Shift Mechanism

Removal

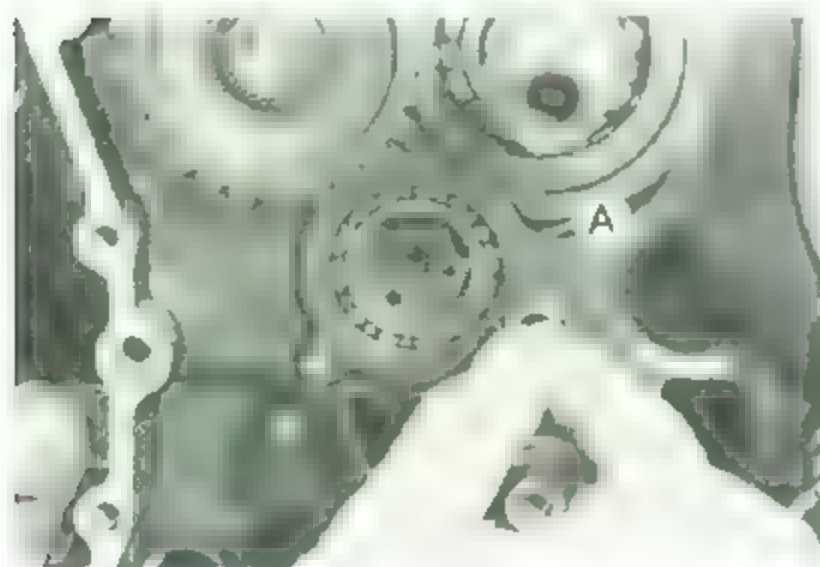
- Remove
 - Shift Pedal
 - Right Engine Cover
 - Clutch Housing
- Pull out the shift shaft with the shift mechanism arm, arm spring and shaft return spring
- Remove the gear positioning lever mounting bolt, and take off the lever and spring
- Remove the Allen bolt in the shift drum cam, and take off the drum cam
- Pull off the dowel pin



A. Shift Shaft C. Gear Positioning Lever
B. Shift Mechanism Arm D. Shift Drum Cam

Installation Notes

- Set the dowel pin into the largest hole of the three which is the nearest hole from the center



A. Dowel Pin Hole

- Apply a non-permanent locking agent to the threads of the shift drum cam Allen bolt
- Before installing the shift shaft, apply high temperature grease to the oil seal lips

Inspection

- Examine the shift shaft for any damage
- Check the shift shaft for bending or damage to the splines
- ★ If the shaft is bent, straighten or replace it. If the splines are damaged, replace the shaft
- Check the return spring and arm spring for cracks or distortion
- ★ If the springs are damaged in any way, replace them
- Check the shift mechanism arm for distortion
- ★ If the shift mechanism arm is damaged in any way, replace the arm.



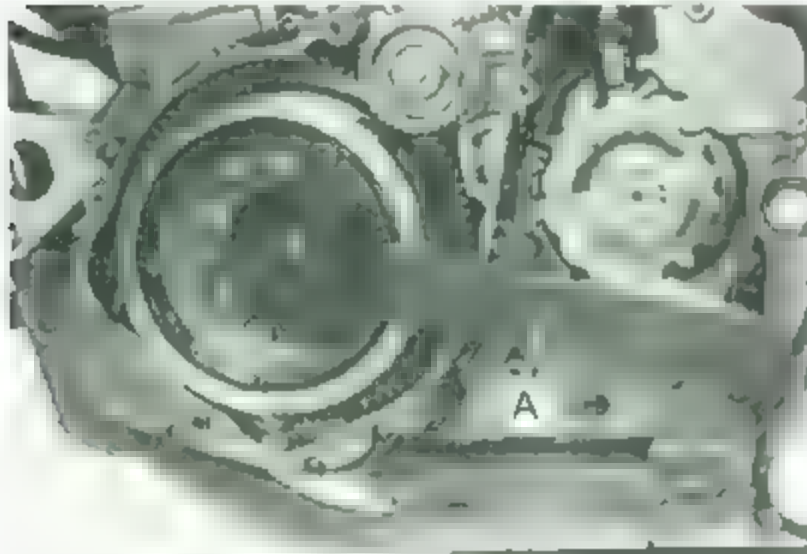
A. Shift Shaft C. Arm Spring
B. Return Spring D. Shift Mechanism Arm

- Check that the return spring pin is not loose
- ★ If it is loose, unscrew it, apply a non-permanent locking agent to the threads, and tighten it to the specified torque (see Exploded View)
- Check the gear positioning lever, and its spring for cracks or distortion
- ★ If the lever or spring is damaged in any way, replace them.
- Visually inspect the shift drum cam
- ★ If it is badly worn or if it shows any damage, replace it

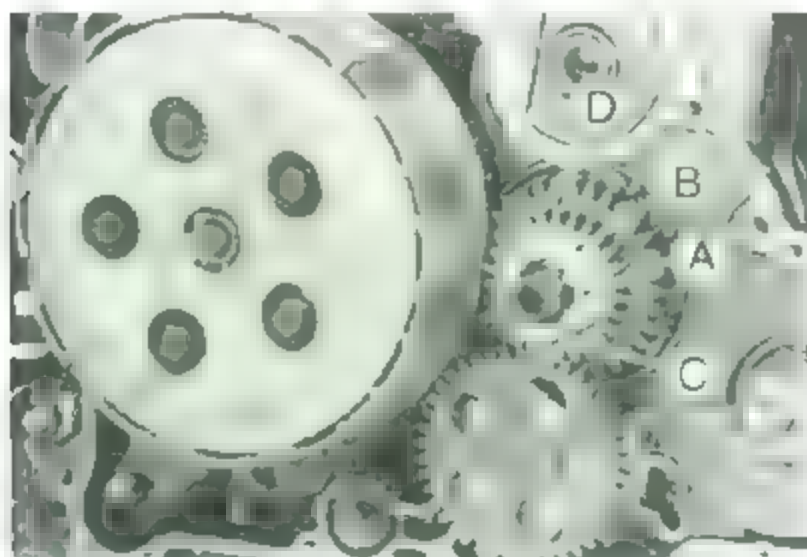
Primary Gear

Removal

- Remove
 - Right Engine Cover
 - Clutch Housing
 - Oil Pump
 - Shift Pedal
 - Engine Sprocket Cover
 - Magneto Cover (place on one side)
- Flatten out the bend claw washer, and remove the primary gear nut with using the rotor holder (special tool) on the magneto flywheel to keep the crankshaft from turning



A Rotor Holder 57001-1184



A Primary Gear Nut
B Claw Washer

C Oil Pump Drive Gear
D Primary Gear

- Remove the claw washer, oil pump drive gear, primary gear key and spacer

Installation Notes

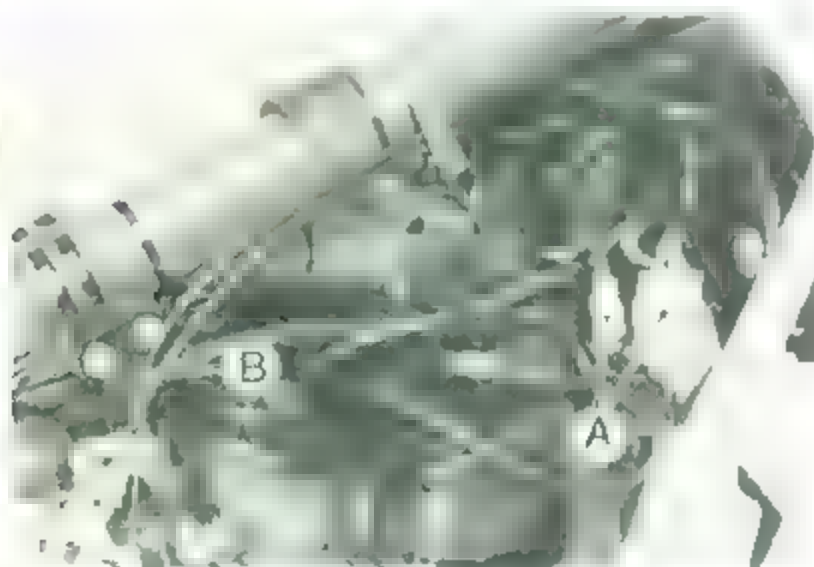
- Fit the claw of the washer into the key groove of the oil pump drive gear
- Tighten the primary gear nut, using the rotor holder (special tool: 57001-1184) to keep the crankshaft from turning to the specified torque (see Exploded View)
- After torquing the nut, bend the one side of claw washer over the nut

5-12 ENGINE RIGHT SIDE / LEFT SIDE

Magneto Cover

Removal

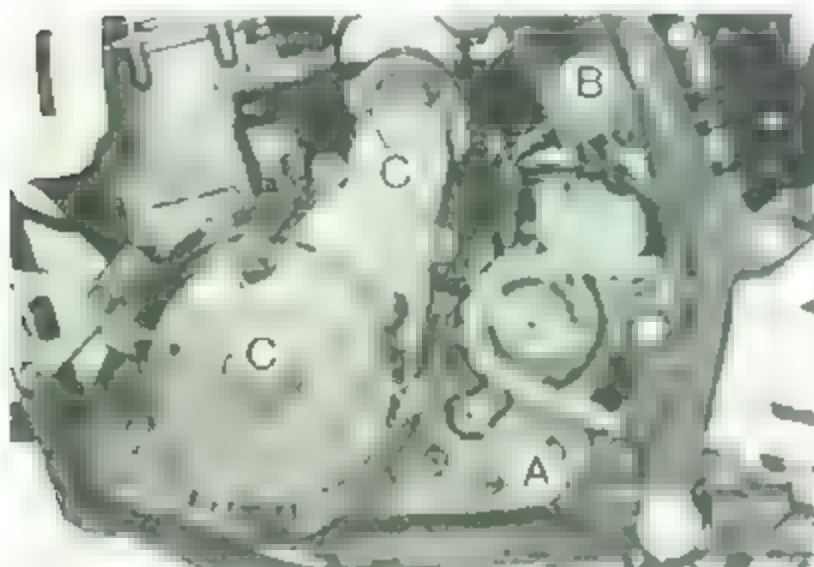
- Remove
 - Engine Oil (drain)
 - Fuel Tank
 - Magneto Lead Connectors (disconnect)
 - Cylinder Head Bracket



A. Connectors

B. Cylinder Head Bracket

- Shift Pedal
- Engine Sprocket Cover
- Neutral Switch Lead Connector
- Magneto Lead Clamps



A. Neutral Switch Lead Connector

C. Cover Bolts

B. Magneto Lead Clamp

- Remove the bolts, and take off the cover with the pickup coil, the stator and lead grommets.

Installation Note

- Run the magneto leads in accordance with the Wire Routing in the General Information chapter

Disassembly/Assembly

See the Flywheel Magneto in the Electrical System chapter

Magneto Flywheel

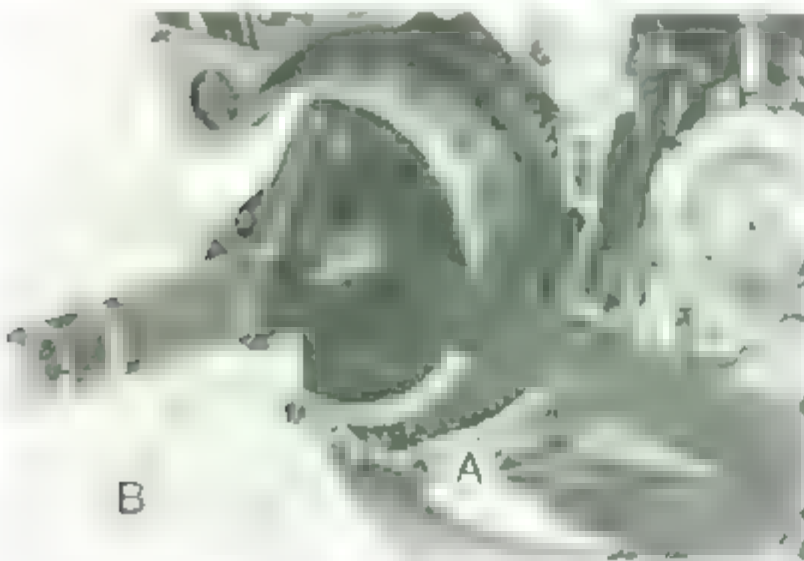
Removal

- Remove
 - Engine Oil (drain)
 - Shift Pedal
 - Engine Sprocket Cover
 - Magneto Lead Clamp
 - Magneto Cover (place on one side)
 - Starter Clutch Idle Gear
- Hold the flywheel steady with the rotor holder (special tool), and remove the flywheel bolt



A Rotor Holder 57001-1184
B Footpeg

- Using the rotor holder (special tool) to hold the flywheel steady, remove the magneto flywheel and starter clutch assembly with the rotor puller (special tool)



A Rotor Holder 57001-1184
B Rotor Puller 57001-1216

CAUTION

- If the flywheel is difficult to remove, turn the puller while tapping the head of the puller with a hammer. Do not strike the flywheel itself. Striking the flywheel can cause the magnets to lose their magnetism.

Installation Notes

- Replace the magneto flywheel bolt with a new one. This bolt is required to replace if it has been tightened one to the specified torque.
- Using a high flashpoint solvent, clean off any oil or dirt that may be on the new flywheel bolt, the tapered portions of the crankshaft and the flywheel. Dry them with a clean cloth.



A Clean off

- Remove the washer and the starter clutch gear
- Assemble the washer and the starter clutch gear into the flywheel with turning the gear to the unlocked direction
- Fit the woodruff key securely in the slot in the crankshaft before installing the flywheel assembly
- Hold the flywheel steady with the rotor holder (special tool: 57001-1184), and tighten the flywheel bolt to the specified torque (see Exploded View)
- Tightening procedure of the flywheel bolt is the following.
 - Tighten the flywheel bolt to 120 N·m (12.0 kg-m, 87 ft-lb) of torque. Do not over tighten it now.
 - Loosen the bolt and then tighten it again to the same torque (above)
 - Finally, tighten the bolt to the specified torque (see Exploded View)
- ★ If any oil is deposited on the threads of the bolt, finally tighten it to 175 N·m (18.0 kg-m, 130 ft-lb) of torque

CAUTION

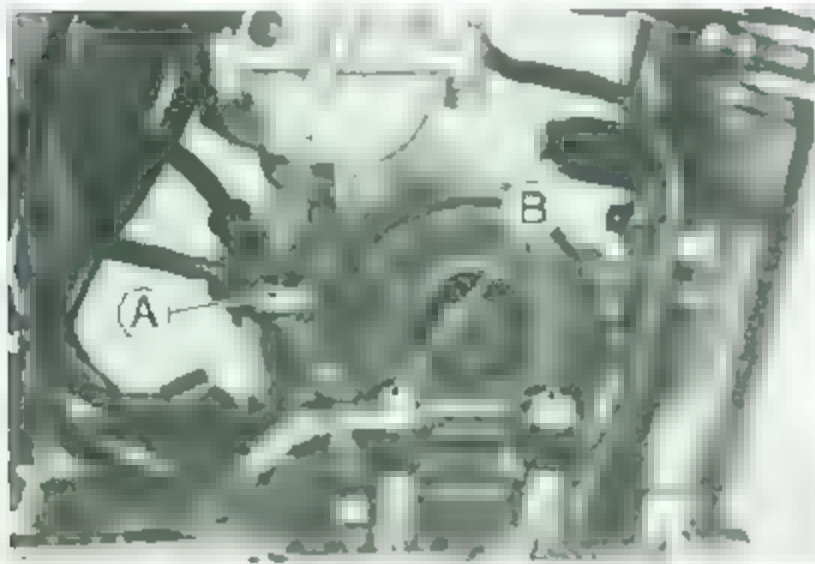
- Use a 6-point socket instead of 12-point one to tighten the flywheel bolt to the specified torque.

5-14 ENGINE RIGHT SIDE / LEFT SIDE

Starter Mechanism

Starter Motor Removal

- Remove:
 - Fairings
 - Exhaust Pipe
- Disconnect the starter motor terminal lead
- Remove the starter motor mounting bolts



A. Terminal

B. Mounting Bolts

- Prying the starter motor loose from the left engine cover with a screwdriver, slide the starter motor off towards the right side of the engine.

CAUTION

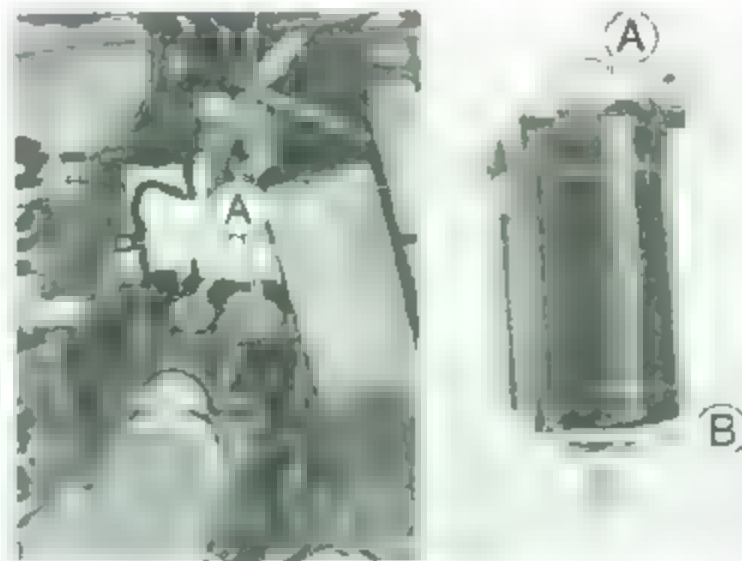
- Do not tap on the starter motor body. Tapping on the body could damage the motor.



A. Pry

Starter Motor Installation Notes

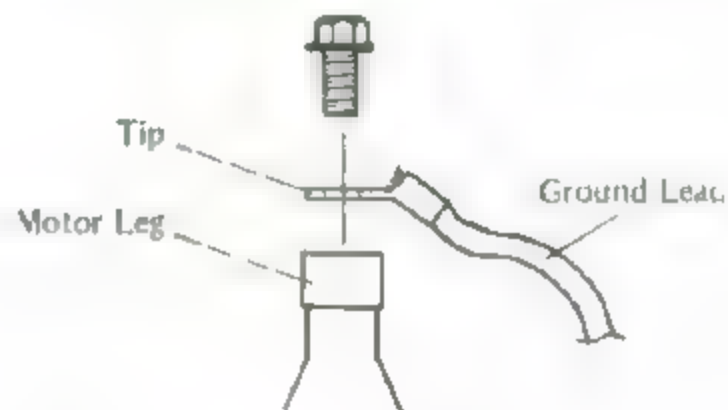
- Clean the starter motor legs and crankcase where the starter motor is grounded
- Apply a little engine oil to the O-ring on the starter motor



A. Clean here

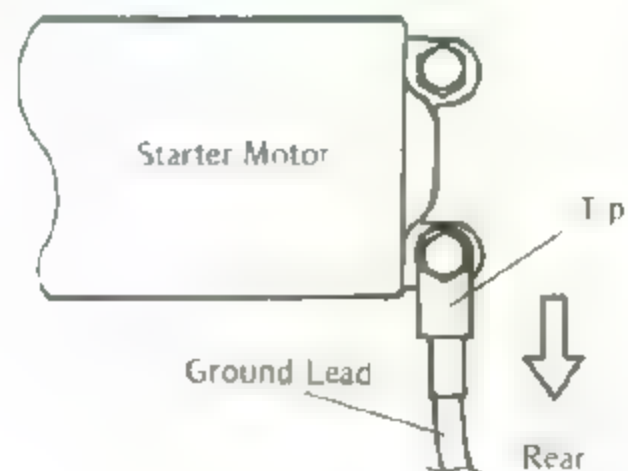
B. O-ring

- Mount the battery ground lead tip with the starter motor rear mounting bolt on the motor leg
- Mount the tip so that its face is as shown.



CAUTION

- Mount the tip with turning to the rear, as inside as possible, to make a gap between the ground lead and the hot exhaust pipe



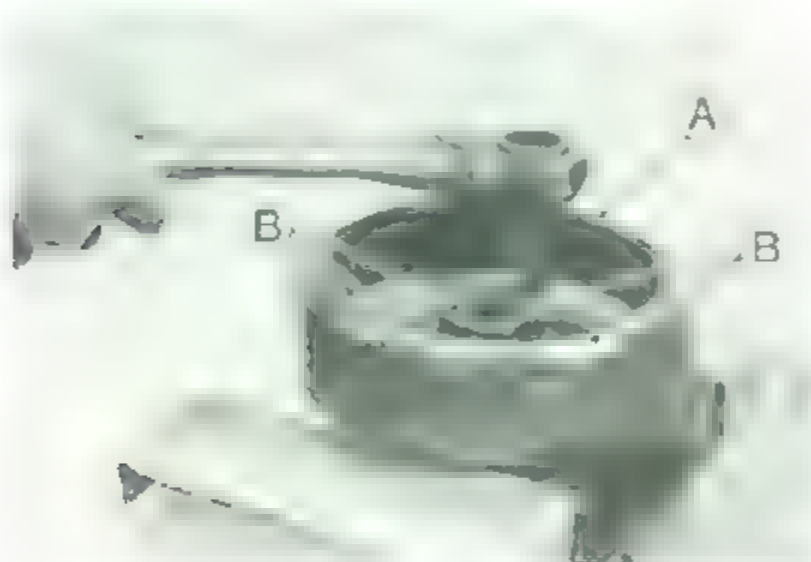
- Tighten the starter motor mounting bolts to the specified torque (see Exploded View)

Starter Motor Disassembly/Assembly/Inspection

- See Electrical System chapter

Starter Clutch Removal

- Remove the magneto flywheel and starter clutch as assembly
- Holding the magneto flywheel in a vise, remove the Allen bolts and separate the starter clutch



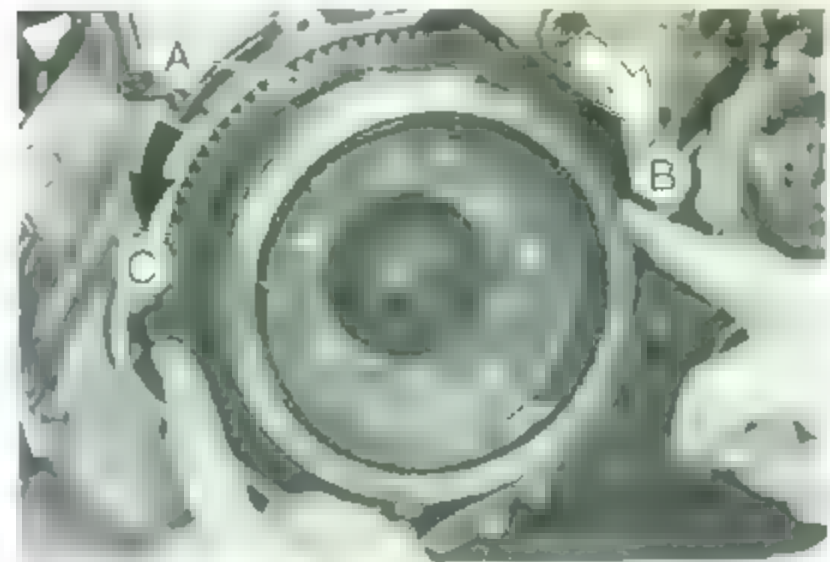
A. Magneto Flywheel B. Starter Clutch Allen Bolts

Starter Clutch Installation Note

- Apply a non-permanent locking agent to the threads of the Allen bolts and tighten them to the specified torque (see Exploded View).

Starter Clutch Inspection

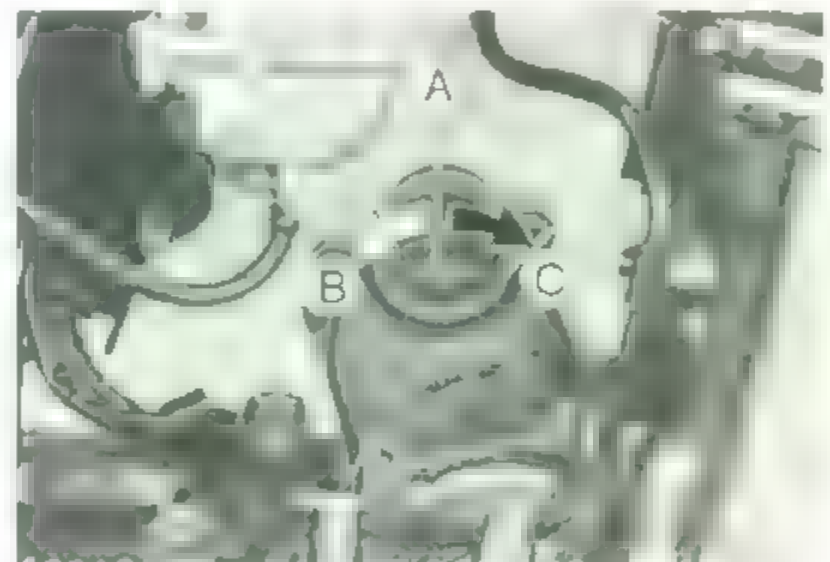
- Remove the magneto cover and starter idle gear, and turn the starter clutch gear by hand. The starter clutch gear should turn clockwise freely but should not turn counterclockwise.
- ★ If the clutch does not operate as it should or if it makes noise, disassemble the starter clutch, examine each part visually and replace any worn or damaged parts.



A. Starter Clutch Gear C. Locked
B. Turns freely

NOTE

- Starter clutch inspection can be done by removing the starter motor, too



A. Starter Idle Gear C. Locked
B. Turns freely

Starter Clutch Gear Removal

- Remove the magneto flywheel and starter clutch as assembly
- In this time, the starter clutch gear may be removed with the flywheel. If so, separate the starter clutch gear from the flywheel.
- Remove the washer, and pull off the starter clutch gear.

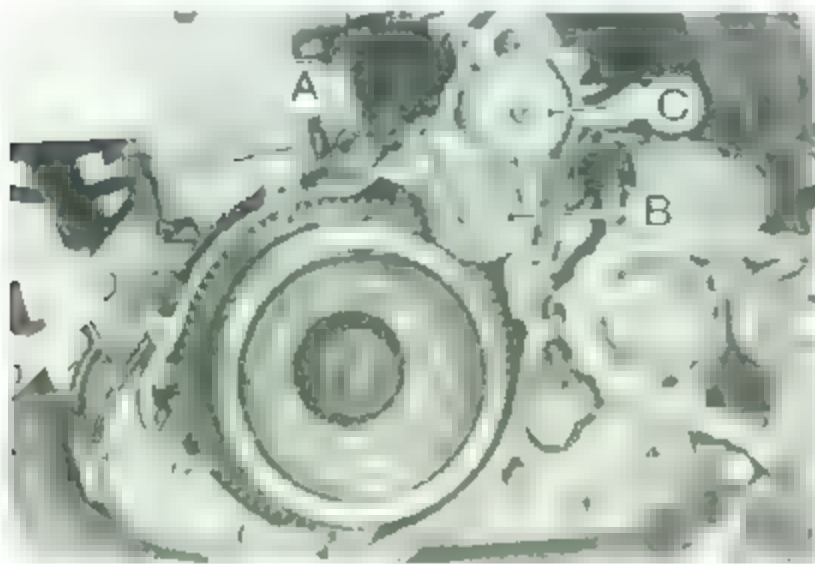
Starter Clutch Gear Installation Notes

- Apply engine oil to the inside bushing of the gear.
- Install the starter clutch gear after assembling it into the flywheel.

5-16 ENGINE RIGHT SIDE / LEFT SIDE

Starter Torque Limiter Removal

- Remove
Magneto Cover (place on one side)
Starter Clutch Idle Gear
- Remove the starter torque limiter



A. Starter Clutch Gear C. Starter Torque Limiter
B. Starter Clutch Idle Gear

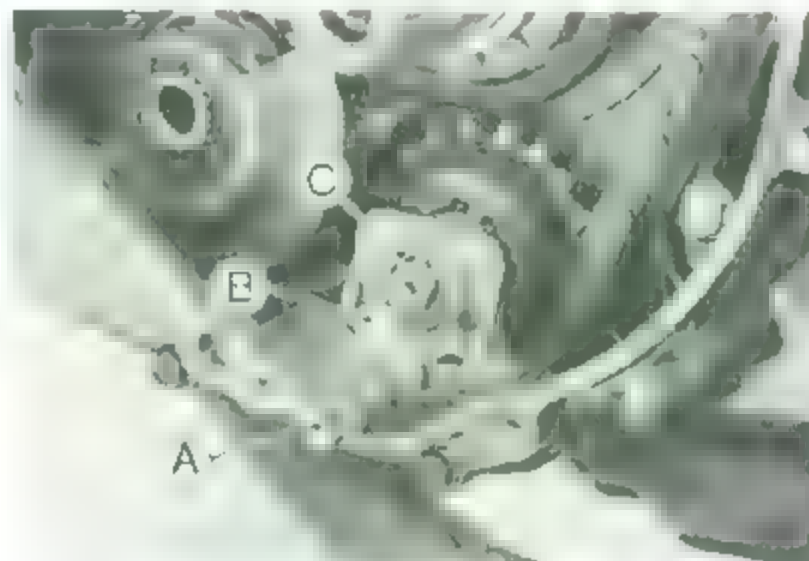
Starter Torque Limiter Installation Note

- Apply molybdenum disulfide grease to the torque limiter shaft

Left Engine Cover

Removal

- Remove .
Magneto Cover (place on one side)
Starter Clutch Idle Gear
Magneto Flywheel
Starter Clutch Gear and Shaft
Starter Torque Limiter
Balancer Chain Tensioner Lock Bolt
Balancer Chain Tensioner Adjusting Lever

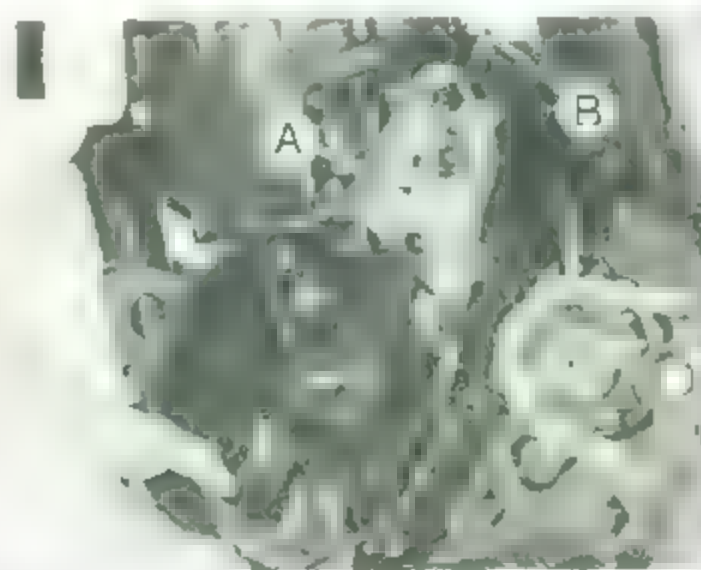


A. Balancer Chain Tensioner Lock Bolt
B. Balancer Chain Tensioner Adjusting Lever
C. Circlip

- Remove the cover bolts, and take off the cover

NOTE

- *Prying the cover upper end loose from the starter motor with a screw driver, take off the cover*



A. Left Engine Cover B. Pry

Installation Notes

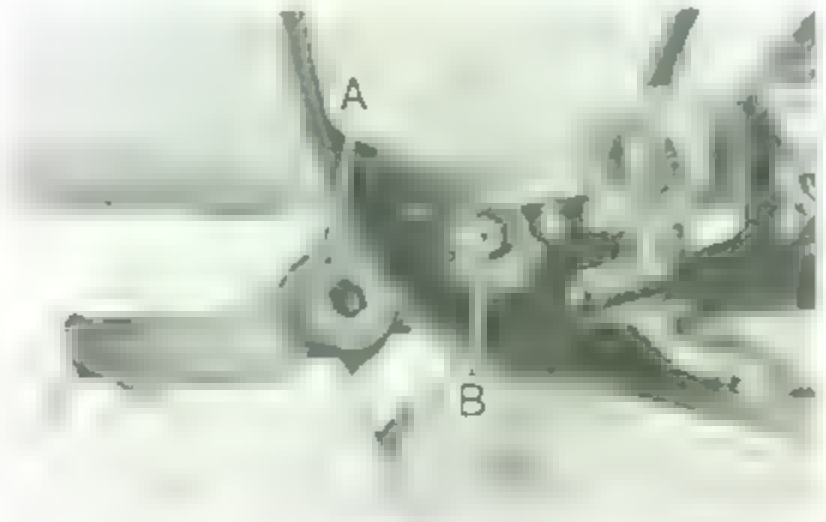
- Before installing the cover, apply a little engine oil to the O-ring on the starter motor.
- Turning the balancer chain tensioner adjusting lever clockwise to tighten the balancer chain, tighten the lock bolt.

Balancer Mechanism*Balancer Chain Tension Adjustment*

Balancer chain wear and chain guide wear cause the chain to develop slack, which will make noise and may result in engine damage.

To prevent this, tension adjustment is necessary in accordance with the Periodic Maintenance Chart.

- Remove the tensioner cap and loosen the tensioner lock bolt a few turns.
- Tighten the bolt securely and install the cap.

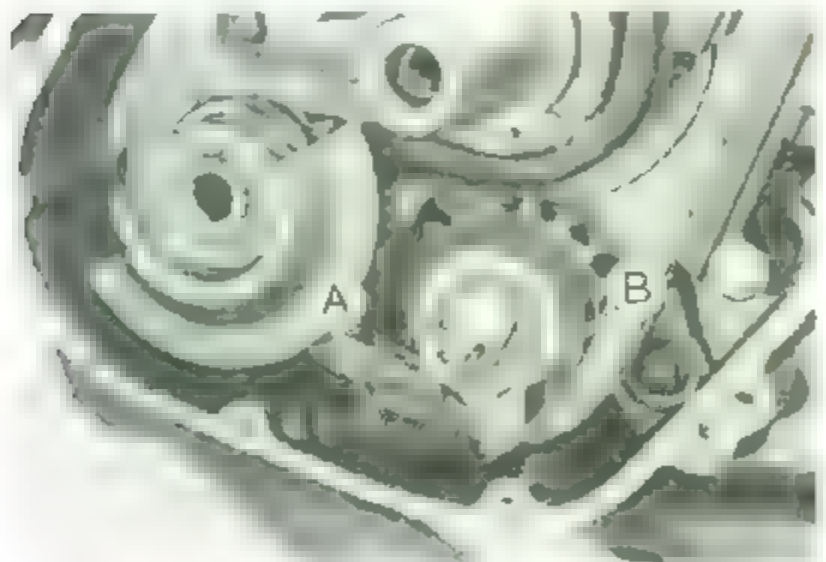


A. Cap

B. Tensioner Lock Bolt

Removal

- Remove
 - Magneto Cover (palce on one side)
 - Magneto Flywheel
 - Starter Mechanism
 - Left Engine Cover
- Remove the tensioner spring
- Remove the circlip, and take off the tensioner lever and washer (Circlip is mounted only on the 89 model)



A. Tensioner Spring

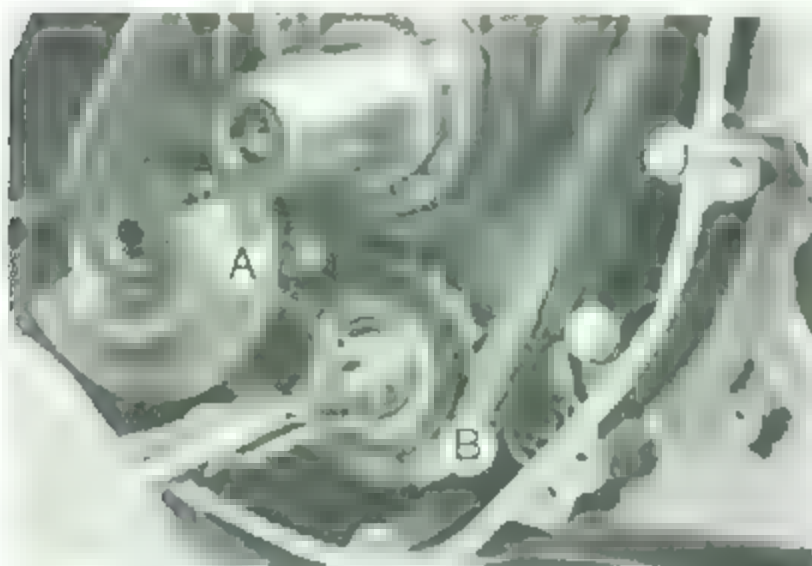
B. Tensioner Lever

- Pull out the idler shaft with a pliers, and take out the idler sprocket, bearing and spacer.

5-18 ENGINE RIGHT SIDE / LEFT SIDE

NOTE

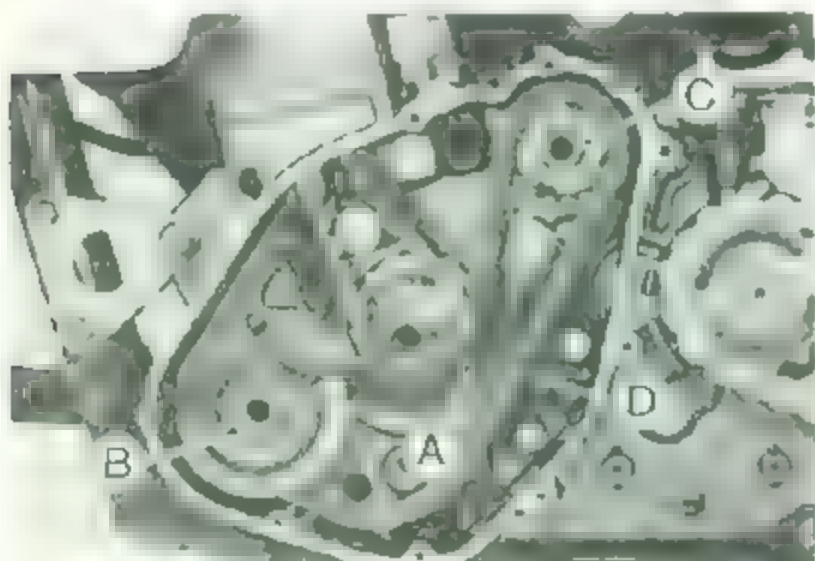
○ Before pulling out the idler shaft, loosen the chain with turning the shaft to the counterclockwise



A. Idler Shaft

B. Pliers

- Remove the inside and outside chain guides.
- Pull the slack of chain forward, remove the front sprocket and left weight coupling assembly
- Remove the rear sprocket and coupling assembly with the chain



A. Inside Chain Guide

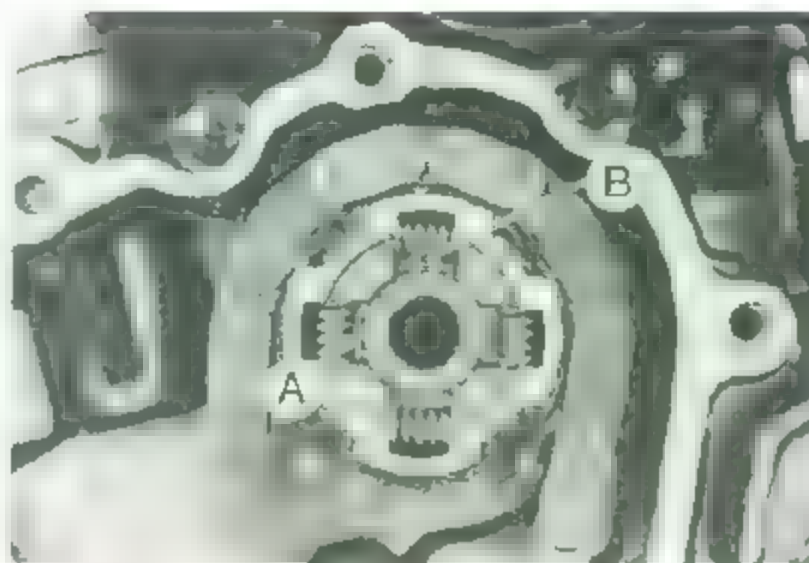
B. Front Sprocket and Left Weight Coupling Assembly

C. Rear Sprocket and Coupling Assembly

D. Outside Chain Guide

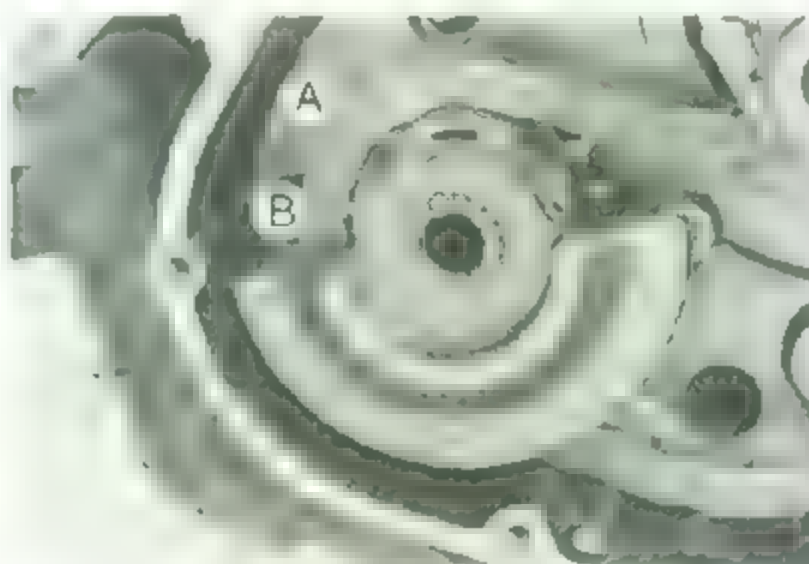
Installation Notes

- The balancer shafts, weights, couplings and sprockets have punch marks. Assemble them, aligning their marks with each other as shown in the figure



A. Shaft Punch Mark

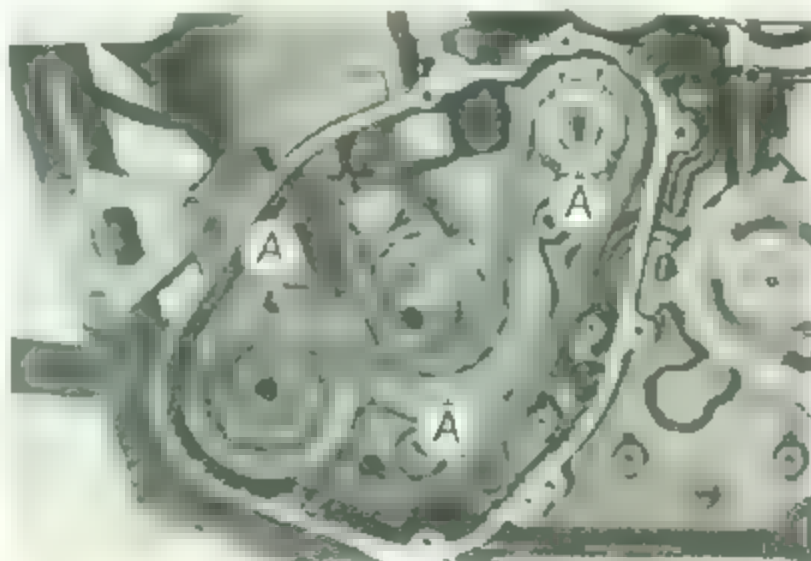
B. Coupling Punch Mark



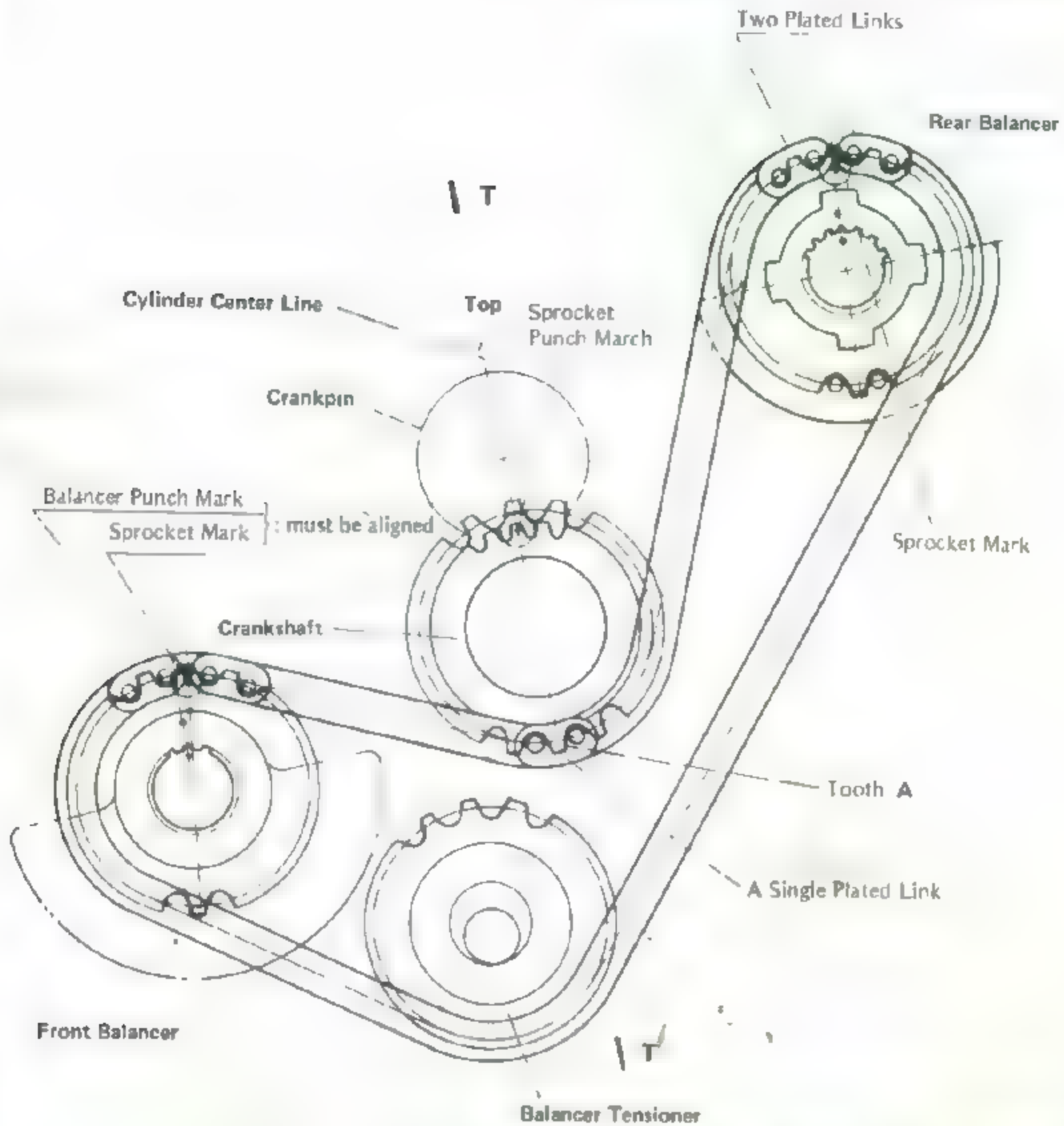
A. Left Weight Punch Mark

B. Shaft Punch Mark (left side)

- Position the crankshaft at TDC where the punch mark on the crankshaft sprocket is at the top
- Engage the balancer chain with the balancer sprockets as shown in the following figure
- The plated links of the chain must face outwards
- Fit tooth A of the crankshaft sprocket into the single plated link
- The tooth A engaged with a single plated link is on opposite side to the sprocket punch mark.
- The other two sprocket teeth with the punch mark must fit between the plated links



A. Plated Links.



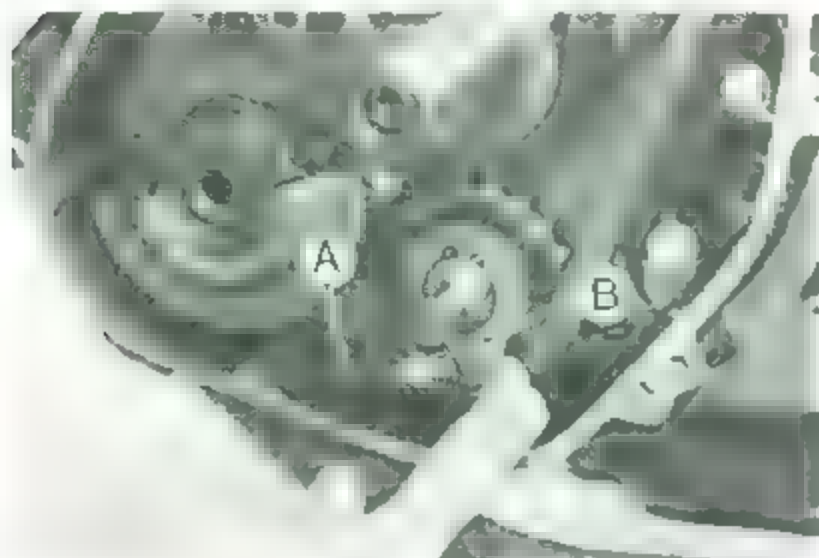
- Apply a non-permanent locking agent to the threads of the inside chain guide bolts, and tighten them to the specified torque (see Exploded View).
- Tap the idler shaft and sprocket into the hole in the left crankcase.



A. Idler Shaft and Sprocket

- Turn the tensioner lever clockwise to tighten the chain.

5-20 ENGINE RIGHT SIDE / LEFT SIDE

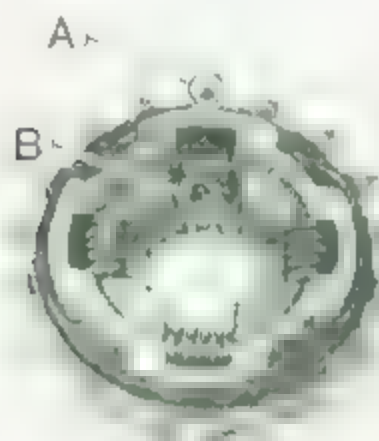


A. Tensioner Spring

B. Tensioner Lever

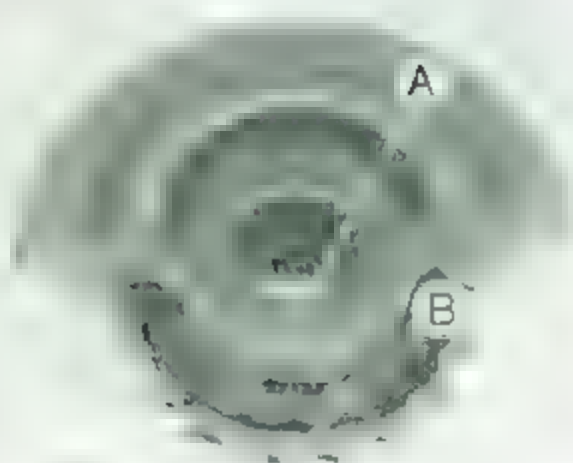
Sprocket and Coupling Assembly Notes

- Align the punch mark on the coupling with the punch mark on the sprocket.



A. Sprocket Mark

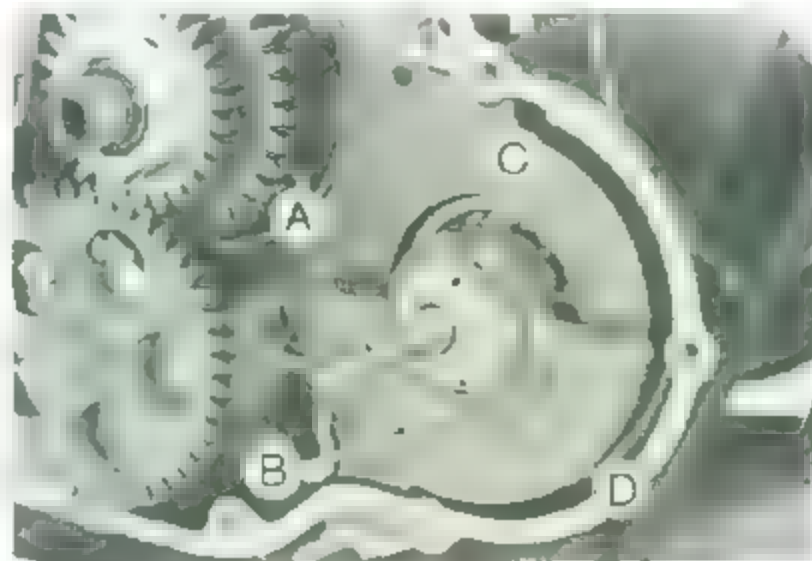
B. Coupling Punch Mark



A. Left Weight Punch Mark B. Sprocket Mark

Right Weight Removal

- Remove
 - Right Engine Cover
 - Magneto Cover (place on one side)
- Flatten out the bent claw washer, and remove the front right weight nut with using the rotor holder (special tool 57001-1184) to keep the crankshaft and balancer shafts from turning.



A. Water Pump Shaft

C. Nut

B. Right Weight

D. Claw Washer

- Remove the claw washer, weight and spacer

Right Weight Installation Notes

- Align the punch mark on the weight with the punch mark on the shaft.



A. Right Weight Punch Mark

B. Shaft Punch Mark (right side)

- Fit the claw of the washer into the hole of the weight
- Tighten the front right weight nut, using the rotor holder (special tool: 57001-1184) to keep the crankshaft from turning, to the specified torque (see Exploded View)
- After torquing the nut, bend the one side of claw washer over the nut.

Rear Weight and Balancer Shaft**Removal/Installation**

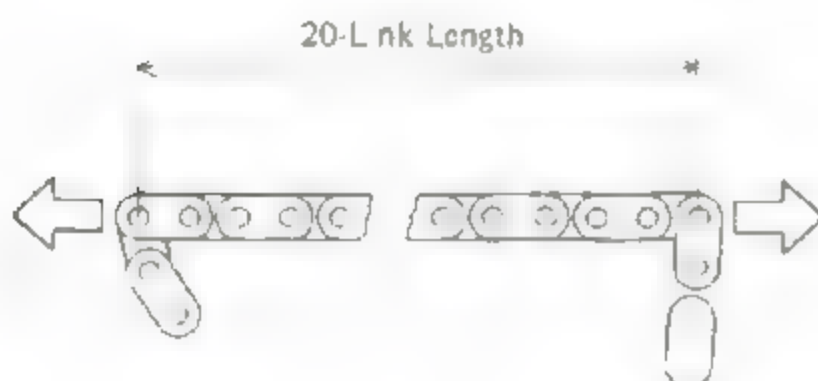
- For the removal/Installation of the rear weight and balancer shafts, operate after crankcase splitting

Balancer Chain Wear

- Hold the chain taut with a force of about 5 kg in some manner, and measure a 20-link length. Since the chain may wear unevenly, take measurements at several places.
- ★ If any measurement exceeds the service limit, replace the chain.

Balance Chain 20-Link Length

Standard:	190.5 ~ 190.9 mm
Service Limit:	193.4 mm

**Camshaft Chain, Balancer Chain Guide Wear**

- Visually inspect the rubber on the guides.
- ★ If the rubber is damaged, cut, or is missing pieces, replace the guides.



1. Camshaft Chain Tension Guide
2. Inside Balancer Chain Guide
3. Outside Balancer Chain Guide

Engine Lubrication System

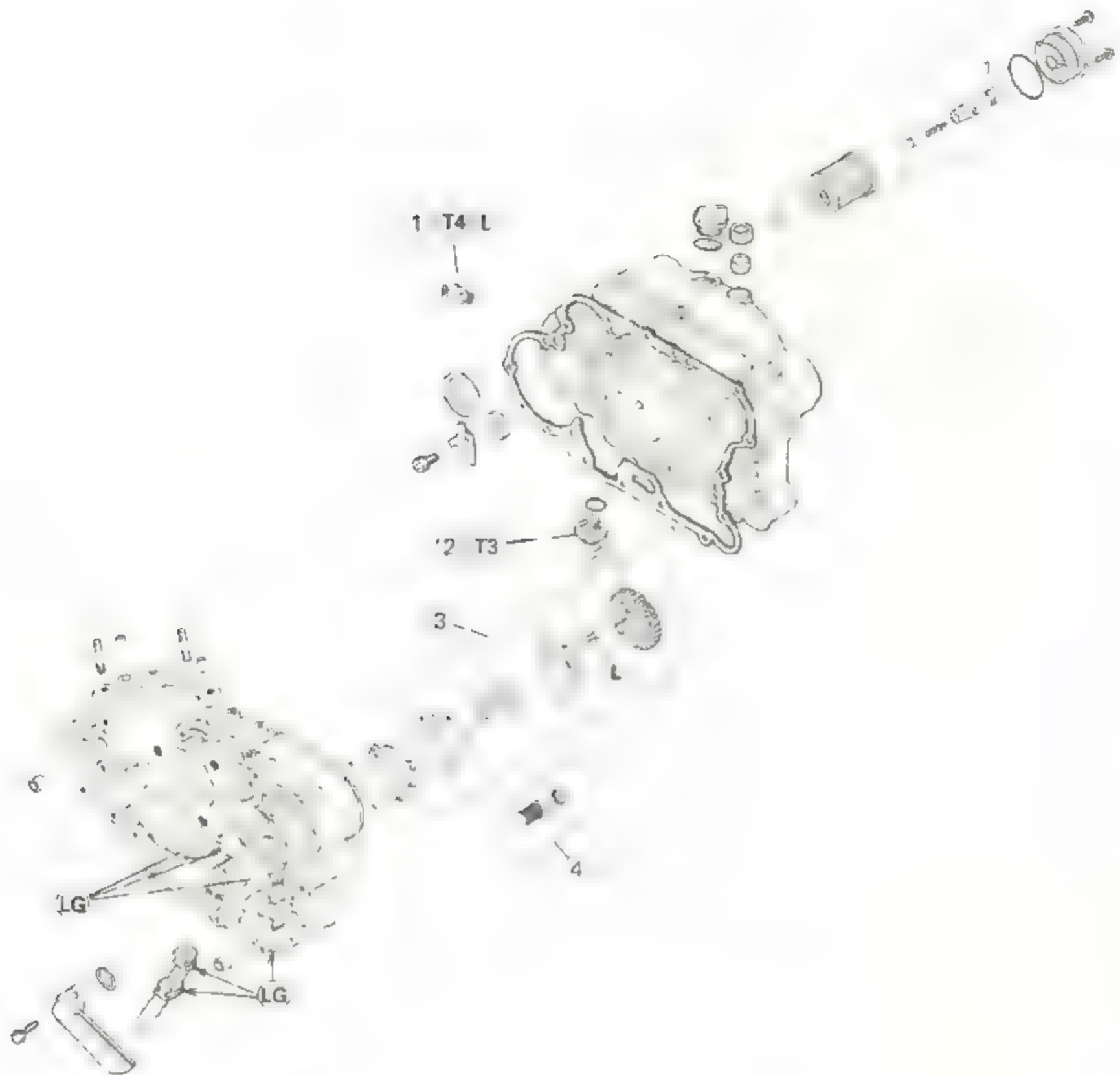
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6-2 ENGINE LUBRICATION SYSTEM

Exploded View





1. Oil Pressure Relief Valve

2. Oil Passage Plug

3. Oil Pump

4. Oil Screen

5. Engine Oil Drain Plug

L : Apply a non-permanent locking agent to the threads.

O : Apply engine oil.

LG: Apply liquid gasket — black (Kawasaki Bond 92104 1003) to the mating surface of the right and left crankcase halves.

S : Follow the specific tightening sequence.

T1: 12 N·m (1.2 kg·m, 8.5 ft·lb)

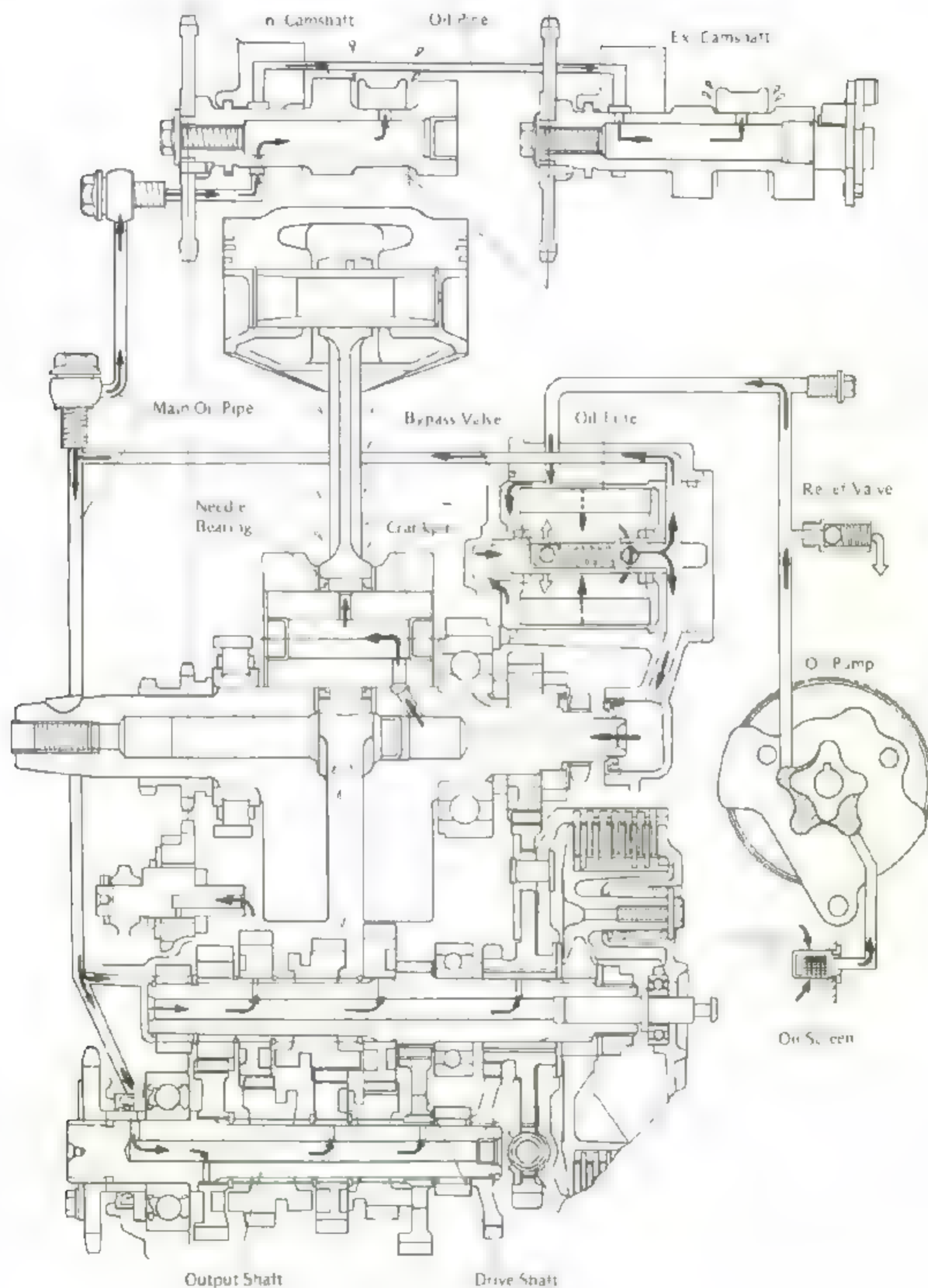
T2: 20 N·m (2.0 kg·m, 14.5 ft·lb)

T3: 23 N·m (2.3 kg·m, 16.5 ft·lb)

T4: 15 N·m (1.5 kg·m, 11.0 ft·lb)

6-4 ENGINE LUBRICATION SYSTEM

Engine Oil Flow Chart



Specifications

Item	Standard
Engine Oil and Oil Filter: Engine Oil: Grade Viscosity Capacity Level	SE or SF class SAE10W40, 10W50, 20W40, or 20W50 2.5L (when engine is completely dry) 2.2L (when filter is not removed) 2.5L (when filter is removed) Between upper and lower levels
Oil Pump and Relief Valve: Relief valve opening pressure Oil pressure @4,000 r/min (rpm), oil temp 90°C (194°F)	430 ~ 590 kPa (4.4 ~ 6.0 kg/cm ² , 63 ~ 85 psi) 78 ~ 147 kPa (0.8 ~ 1.5 kg/cm ² , 11 ~ 21 psi)

Special Tools

Oil Pressure Gauge: 57001-164



Oil Pressure Gauge Adapter: 57001-1182



6-6 ENGINE LUBRICATION SYSTEM

Engine Oil and Oil Filter

WARNING

- Motorcycle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine or transmission seizure, accident, and injury

Oil Level Inspection

- If the oil has just been changed, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Stop the engine, then wait several minutes until the oil settles

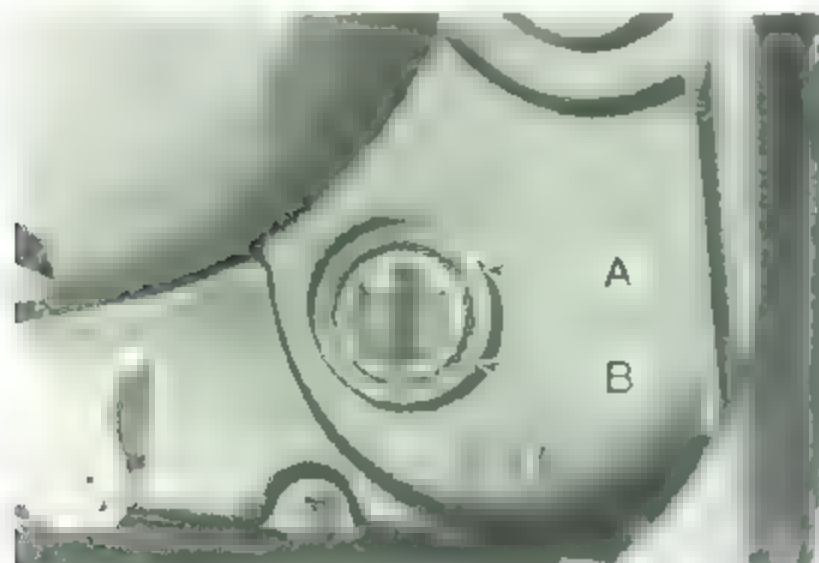
CAUTION

- Racing the engine before the oil reaches every part can cause engine seizure.

- If the motorcycle has just been used, wait several minutes for all the oil to drain down.
- Stand the motorcycle so that it is perpendicular to the ground, and check the engine oil level through the oil level gauge. The oil level should come up between the upper and lower level lines.
- ★ If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.
- ★ If the oil level is too low, add the correct amount of oil through the oil filler opening. Use the same type and make of oil that is already in the engine

NOTE

- If the engine oil type and make are unknown, use any brand of the specified oil to top up the level in preference to running the engine with the oil level low. Then at your earliest convenience, change the oil completely



A. Upper Level

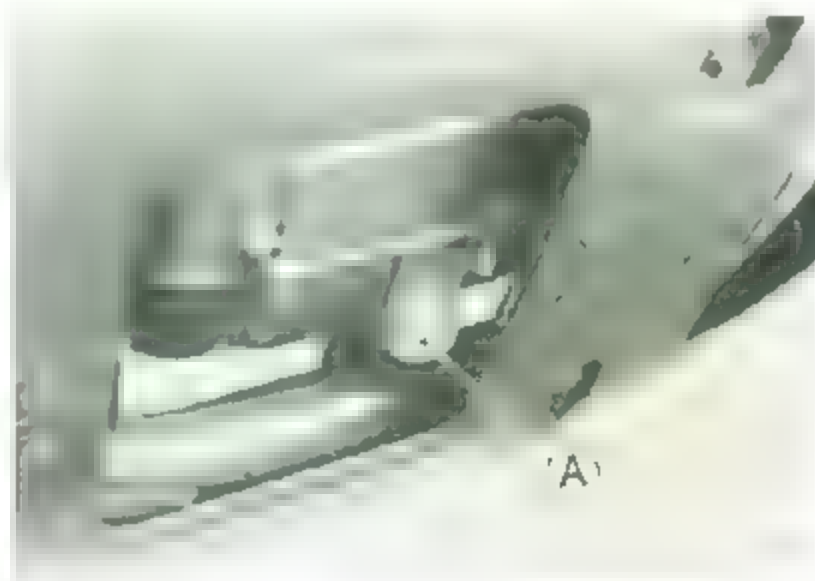
B. Lower Level

Oil and/or Filter Change

- Warm up the engine so that the oil will pick up any sediment and drain easily. Then stop the engine
- Place an oil pan beneath the engine
- Remove the engine drain plug, and let the oil drain completely

NOTE

- Hold the motorcycle upright so that the oil may drain completely



A. Drain Plug

- If the oil filter is to be changed, replace it with a new one
- Check the gasket at the drain plug for damage
- ★ Replace the gasket with a new one if it is damaged
- After the oil has completely drained out, install the drain plug with the gasket, and tighten it to the specified torque (see Exploded View).
- Fill the engine with a good quality motor oil specified in the table.
- Check the oil level

Engine Oil

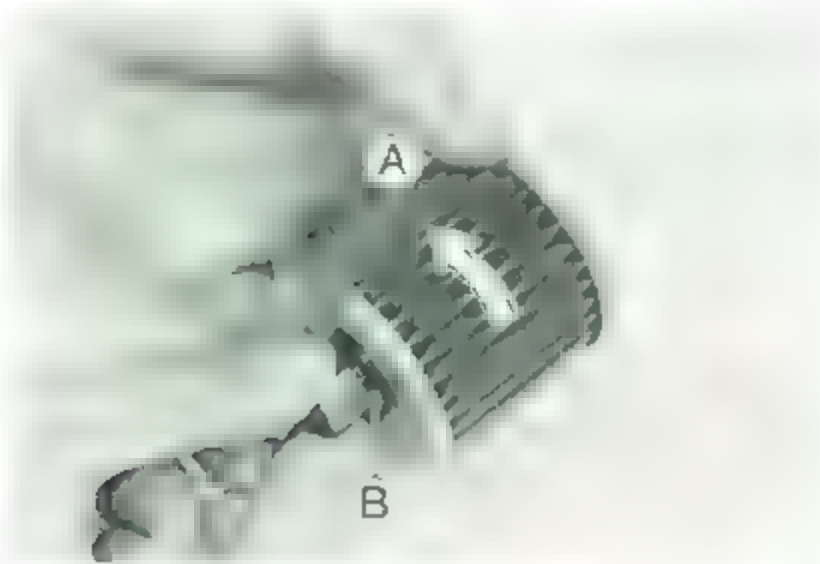
Grade:	SE or SF class
Viscosity:	SAE10W40, 10W50, 20W40, 20W50
Capacity:	2.5L (when engine is completely dry) 2.2L (when filter is not removed) 2.5L (when filter is removed)
Level:	Between upper and lower levels

Oil Filter Removal

- Remove the oil filter cap with prying the pry point
- Take out the oil filter

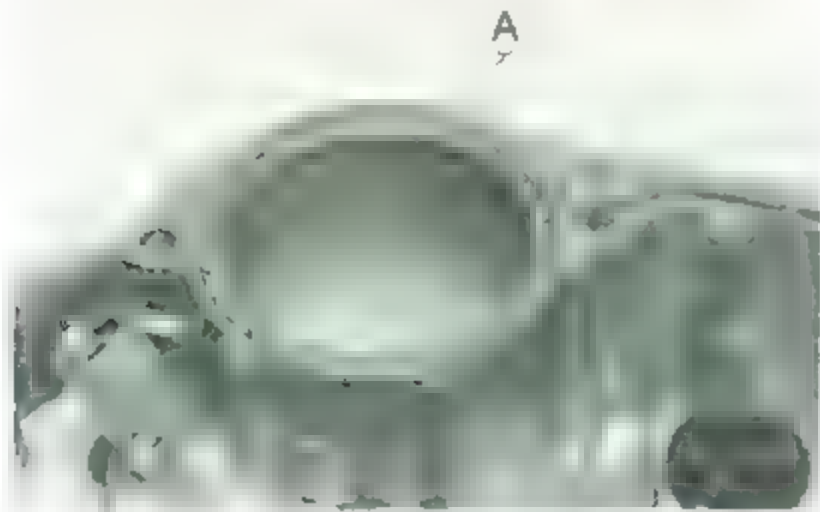
Oil Filter Installation Notes

- Apply oil to the mounting pin, turn the filter element or the mounting pin to work the element into place. Be careful that the element grommets do not slip out of place



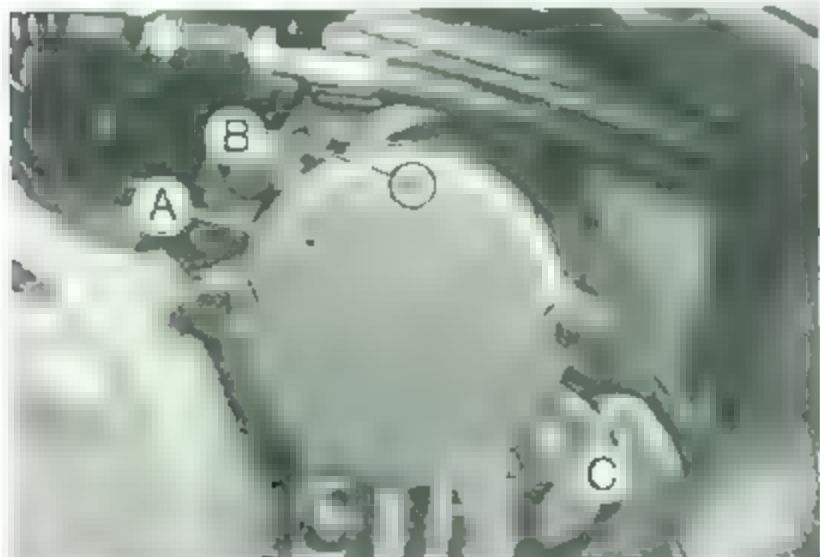
A Turn the element B. Grommet

- When installing the oil filter, put the mounting pin into the filter so that the smaller diameter end is inward
- Fit the O-ring of the oil filter in place, being careful not to twist the O-ring



A. O-ring

- Install the oil filter cap so that the arrow points upwards.

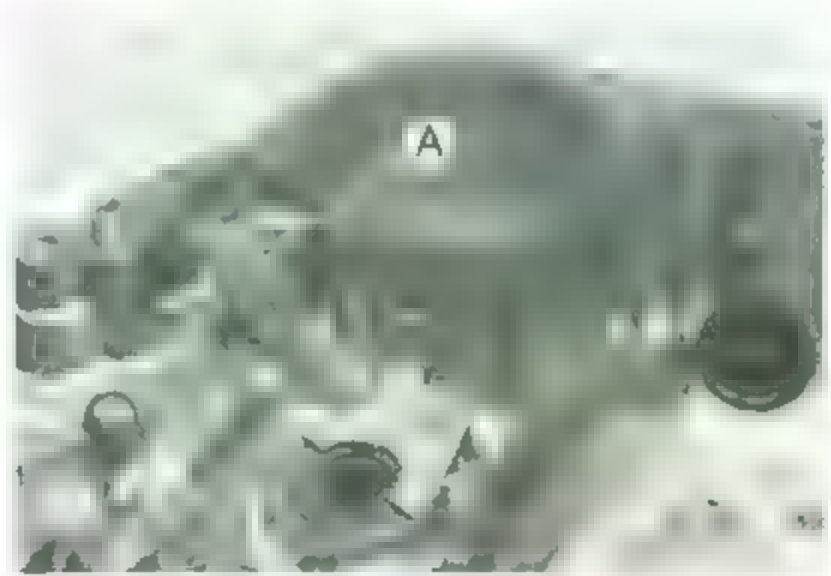


A. Oil Filter Cap B. Arrow C. Pry Point (for removal)

Oil Pump and Relief Valve

Relief Valve Removal

- Remove the right engine cover
- Remove the relief valve from the oil passage on the right engine cover



A. Relief Valve

Relief Valve Installation Notes

- Apply a non permanent locking agent to the threads of the relief valve, and tighten it to the specified torque (see Exploded View)

CAUTION

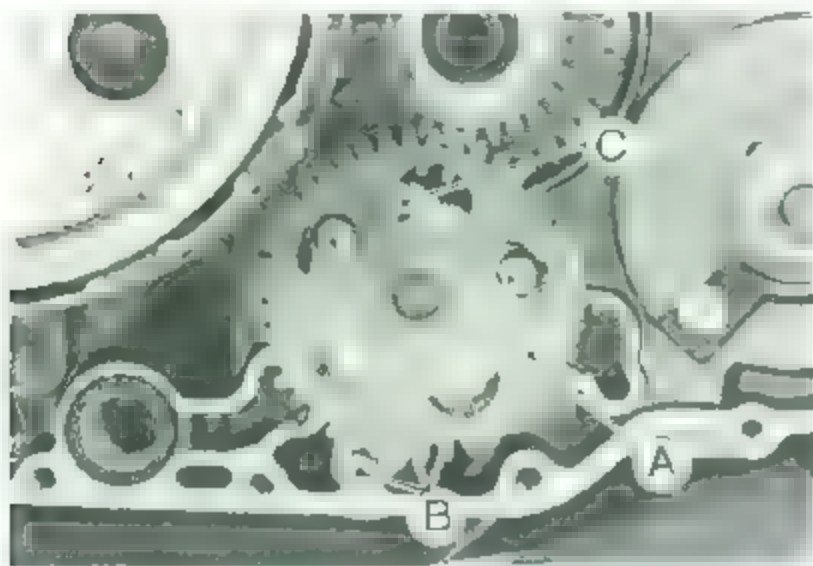
- Do not over-apply a non-permanent locking agent to the threads. This may block the oil passage

- See the next section for Relief Valve Inspection

Oil Pump Removal

- Remove the right engine cover
- Turn the crankshaft so that the engine oil pump screws (3) can be removed through the oil pump gear hole, and remove the screws (3) and oil pump.

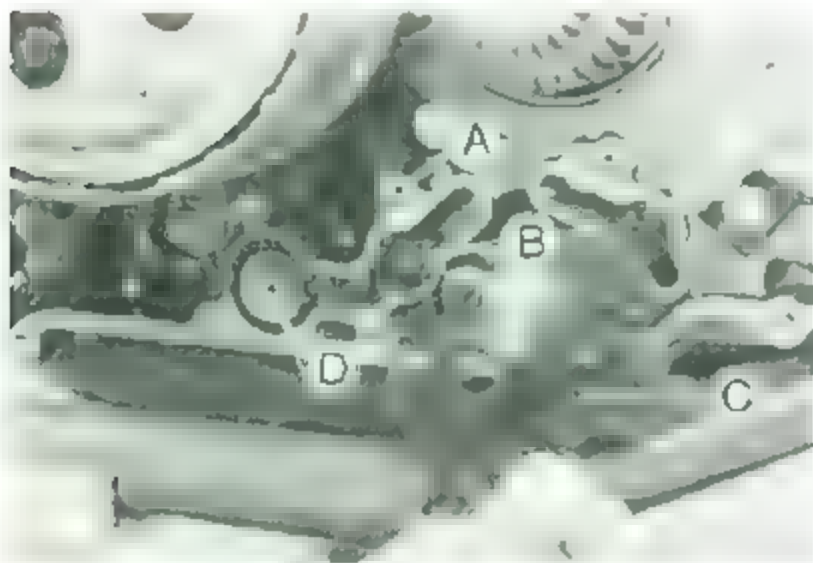
6-8 ENGINE LUBRICATION SYSTEM



A. Oil Pump Gear
B. Oil Pump Screws
C. Oil Pump Cover Screw: removal is not required

Oil Pump Installation Notes

- Clean any metal particles and dirt off the oil screen
- Fill the oil pump with engine oil for initial lubrication
- Check to see that the knock pins (2), plugs (2) the screen and new gasket are in place



A. Knock Pin
B. Plug
C. Gasket
D. Oil Screen

Oil Pump Disassembly

- Remove the oil pump.
- Remove the oil pump cover screw, and take off the pump cover
- Take out the inner and outer rotor
- Take out the pin, and pull off the oil pump gear and shaft

Oil Pump Assembly Notes

- Apply a non permanent locking agent to the threads of the oil pump cover screw.
- Before installing the oil pump, be sure the shaft and rotors turn freely

Oil Pump Drive Gear Removal

- The oil pump drive gear is removed during primary gear removal (see Engine Right Side/Left Side chapter)

Oil Pump Drive Gear Installation

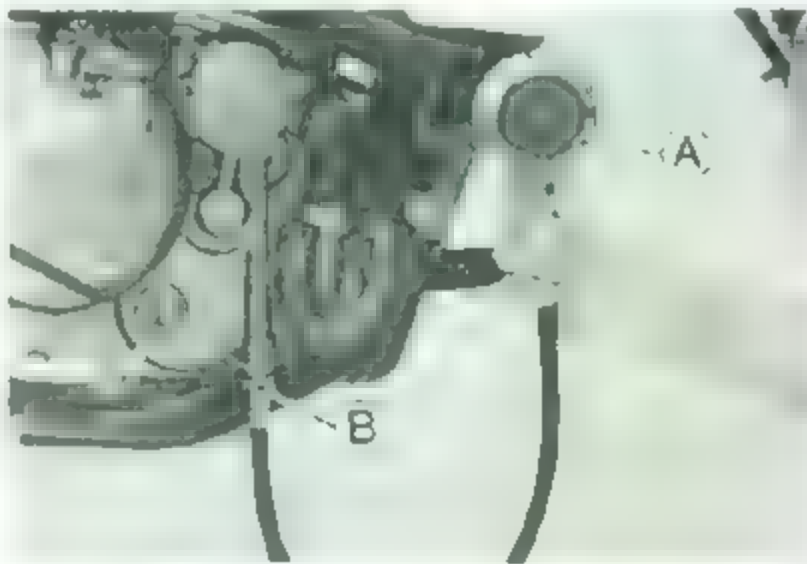
- The oil pump drive gear is installed during primary gear installation (see Engine Right Side/Left Side chapter).

Oil Pressure Measurement

Measuring the oil pressure when the engine is cold (about room temperature) is a way to inspect relief valve operation. First inspect the relief valve operation with the engine to measure the oil pressure at the normal operating temperature

When the engine is cold:

- Remove the lower fairing
- Remove the oil passage plug
- Install oil pressure gauge (special tool) and adapter (special tool)



A. Oil Pressure Gauge: 57001-164
B. Adapter 57001-1182

- Start the engine, and read the oil pressure gauge while running the engine at various speeds. A normal relief valve keeps the maximum oil pressure between the specified values.

Relief Valve Opening Pressure

430 ~ 590 kPa
(4.4 ~ 6.0 kg/cm², 63 ~ 86 psi)

- Stop the engine.
- Remove the oil pressure gauge and adapter
- Install the oil passage plug
- ★ If the reading exceeds the standard by very much, the relief valve is stuck at its closed position
- ★ If the reading is much lower than the standard, the relief valve may be stuck open, or there may be other damage in the lubrication system. Stop the engine immediately and find the cause

When the engine is warmed up.

- Warm up the engine, and then stop the engine.
- Install the oil pressure gauge and adapter as shown above

WARNING

- If the oil passage plug is removed while the engine is warm, hot engine oil will drain through the oil passage take care against burns.

- Start the engine again
- Run the engine at the specified speed, and read the oil pressure gauge
- Stop the engine.
- Remove the oil pressure gauge and adapter
- Install the oil passage plug and tighten it to the specified torque (see Exploded View)
- Install the lower fairing
- ★ If the oil pressure is significantly below the specification, inspect the oil pump and relief valve.

Oil Pressure

78 ~ 147 kPa (0.8 ~ 1.5 kg/cm²,
11 ~ 21 psi) @4,000 r/min (rpm), 90°C
(194°F) of oil temp.

- ★ If the oil pump and relief valve are not at fault, inspect the rest of the lubrication system

Oil Pump Inspection

- Disassemble the oil pump.
- Visually inspect the oil pump body, outer and inner rotors, and covers
- ★ If there is any damage or uneven wear, replace the rotors or the oil pump assembly

Relief Valve Inspection

- Remove the relief valve
- Check to see if the steel ball inside the valve slides smoothly when pushing it in with a wooden or other soft rod, and see if it comes back to its seat by valve spring pressure.

NOTE

- Inspect the valve in its assembled state. Disassembly and assembly may change the valve performance.

- ★ If any rough spots are found during above inspection wash the valve clean a high flash-point solvent and blow out any foreign particles that may be in the valve with compressed air

WARNING

- Clean the parts in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flashpoint solvents

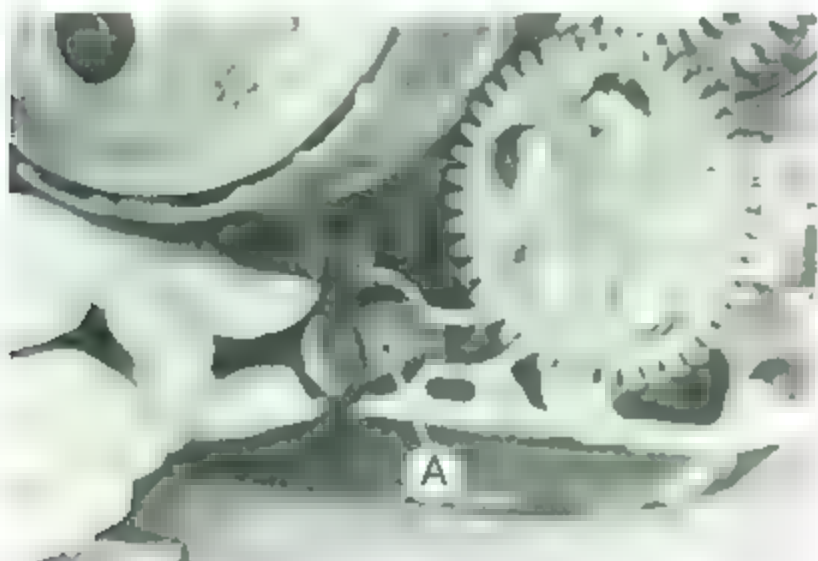
- ★ If cleaning does not solve the problem, replace the relief valve as an assembly. The relief valve is precision made with no allowance for replacement of individual parts.

6-10 ENGINE LUBRICATION SYSTEM

Oil Screen

Removal

- Remove the right engine cover
- Pull out the oil screen



A. Oil Screen

Installation Note

- Clean the oil screen thoroughly whenever it is removed for any reason

Cleaning and Inspection

- Clean the oil screen with high flash-point solvent and remove any particles stuck to it

WARNING

- Clean the screen in a well-ventilated area and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents.

NOTE

- While cleaning the screen, check for any metal particles that might indicate internal engine damage

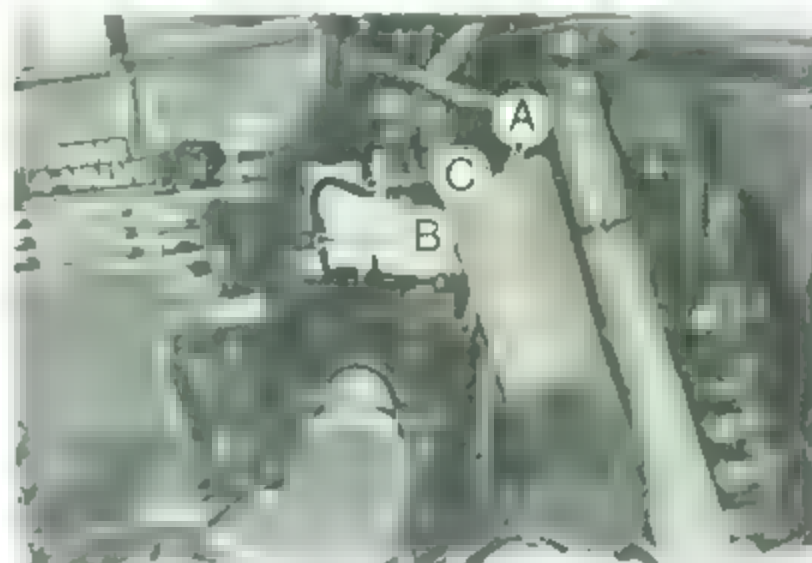
- Check the screen carefully for any damage: holes and broken wires

- ★ If the screen is damaged, replace it.

Oil Pipe

Main Oil Pipe Removal

- Remove
 - Exhaust Pipe
 - Starter Motor
 - Engine Sprocket Cover
 - Magneto Lead Clamp
- Remove the banjo bolts and mounting bolt, take off the pipe



A. Banjo Bolts

B. Mounting Bolt

C. Main Oil Pipe

Main Oil Pipe Installation Notes

- Before installation, flush out the pipe with a high flash point solvent.
- Fill the pipe with engine oil to shorten air bleeding time and prevent engine damage
- Discard the used gaskets and install new gaskets on each side of the pipe fittings
- Lightly tighten the banjo bolts and mounting bolt to a snug fit, and tighten the banjo bolts to the specified torque (see Exploded View)

Cylinder Head Oil Pipe Removal

- See Camshaft Removal in the Engine Top End chapter

Cylinder Head Oil Pipe Installation Notes

- See Camshaft Installation Notes in the Engine Top End chapter

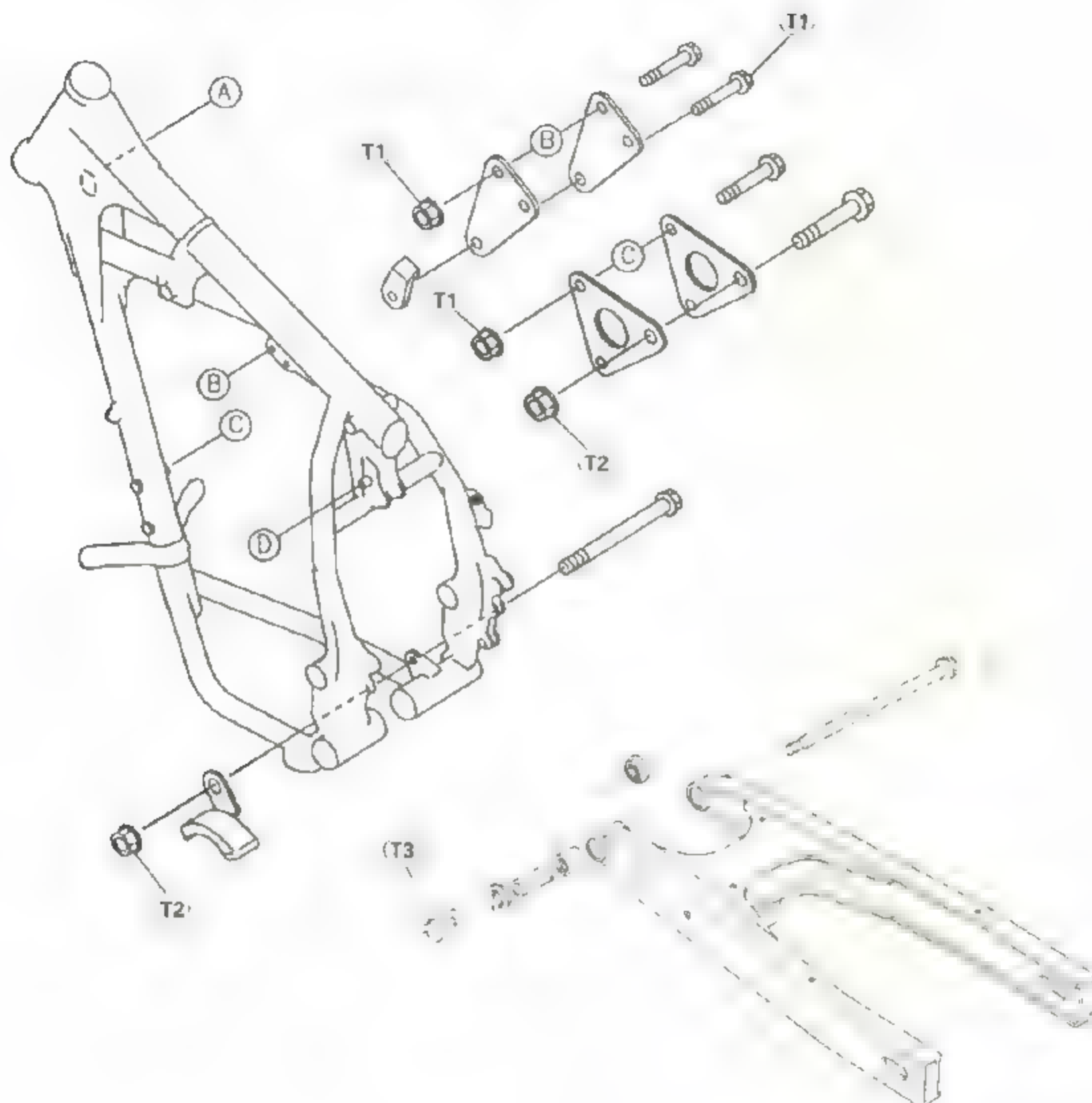
Engine Removal / Installation

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7-2 ENGINE REMOVAL / INSTALLATION

Exploded View



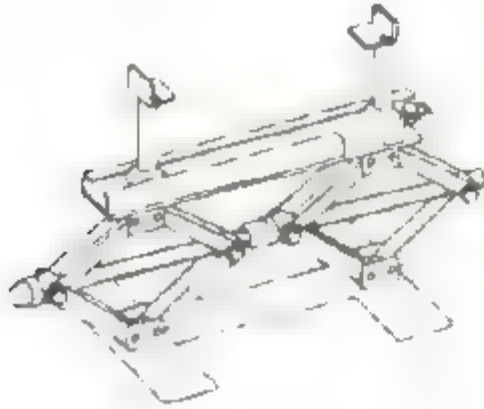
T1: 26 N-m (2.5 kg-m, 18.0 ft-lb)

T2: 44 N-m (4.5 kg-m, 33 ft-lb)

T3: 98 N-m (10.0 kg-m, 72 ft-lb)

Special Tool

Jack Stand: 57001-1238



Engine Removal/Installation

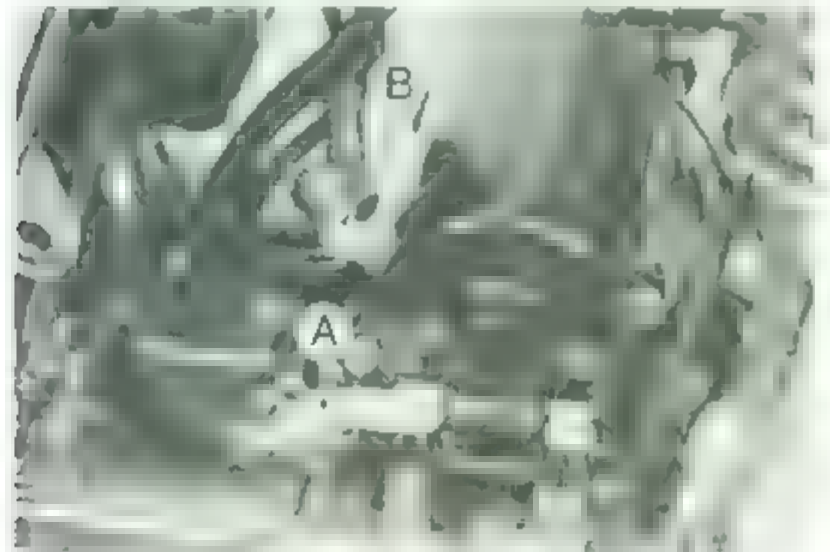
Removal

● Remove (see appropriate chapter)

Engine Oil (drain)
 Fairings
 Coolant (drain)
 Exhaust Pipe
 Side Covers
 Seat
 Fuel Tank
 Carburetor
 Water Hose
 Radiator Fan
 Radiator
 Ignition Coil
 Cylinder Head Bracket
 Side Stand Switch Cover
 Left Footpeg
 Shift Pedal
 Engine Sprocket Cover
 Engine Sprocket
 Right Footpeg
 Brake Pedal and Spring
 Clutch Cable Lower End
 Engine Breather Hose Lower End

● Disconnect :

Fan Motor Lead Connector
 Fan Switch Lead Connector
 Ignition Coil Lead Connectors and Plug Cap
 Water Temperature Sensor Lead Connector
 Magneto Lead Connectors
 Battery Ground Lead
 Starter Motor Terminal Lead



A Battery Ground Lead
 B Starter Motor Terminal Lead

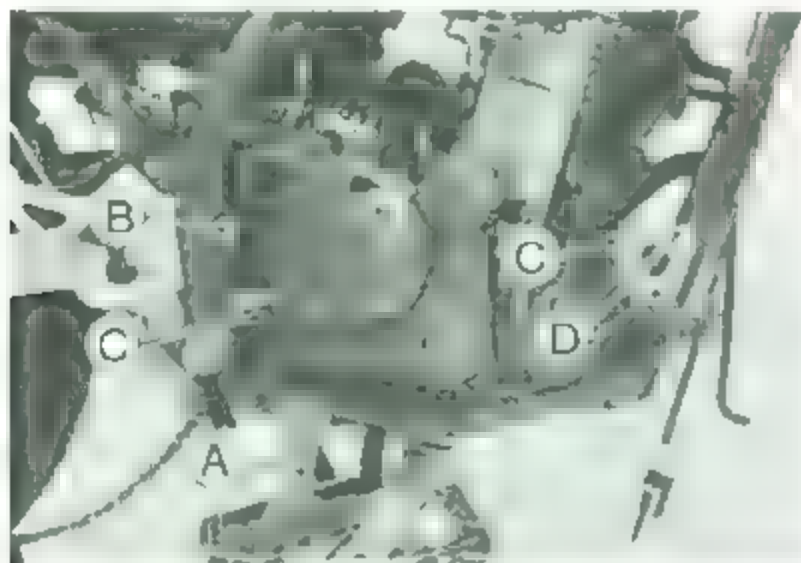
7-4 ENGINE REMOVAL / INSTALLATION

NOTE

If the crankcase is to split after engine removal, you may remove the following parts in the following order for easy engine removal and crankcase splitting (see appropriate chapter).

Cylinder Head Cover
Magnet Cover
Right Engine Cover
Clutch
Oil Pump and Oil Screen
Oil Pump Drive Gear and Primary Gear
External Shift Mechanism
Balancer Right Weight
Starter Mechanism
Camshaft Chain Tensioner
Camshafts
Magnet Flywheel and Starter Clutch
Left Engine Cover
Main Oil Pipe
Inside Balancer Chain Guide
Camshaft Chain
Camshaft Chain Tension Guide
Balancer Mechanism
Cylinder Head
Cylinder, Piston

- Place the jack stand (special tool) under the frame to steady the motorcycle
- Using a suitable jack under the engine, jack the engine up slightly to take the weight off the swing arm pivot shaft and engine mounting bolts and bracket bolts.



- A. Jack Stand 57001-1238
B. Swing Arm Pivot Shaft
C. Engine Mounting Bolts
D. Engine Bracket Bolts

- Pull out the swing arm pivot shaft three quarters to avoid the swing arm falling down but disengage it from the engine
- Remove the engine mounting bolts and bracket bolts.
- Using the jack, take out the engine to the left

Installation Notes

- Tighten the nuts to the specified torque (see Exploded View) in the following order: swing arm pivot shaft, engine mounting bolts, and then bracket bolts
- To route the leads, cables and hoses, refer to the General Information chapter
- To install parts removed, refer to the appropriate chapters
- Fill the engine with coolant (see Coolant Change in the Cooling System chapter).
- Fill the engine with engine oil (see Engine Oil Change in the Engine Lubrication System chapter)
- Adjust:
 - Throttle Cable
 - Clutch Cable
 - Choke Cable
 - Drive Chain
 - Rear Brake Pedal

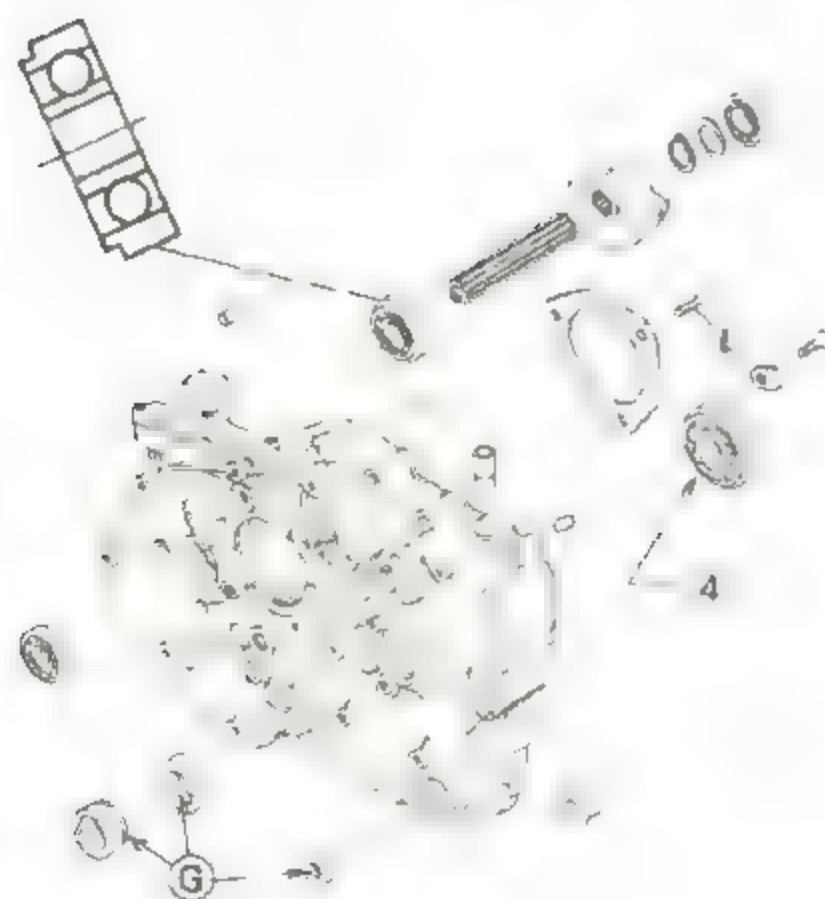
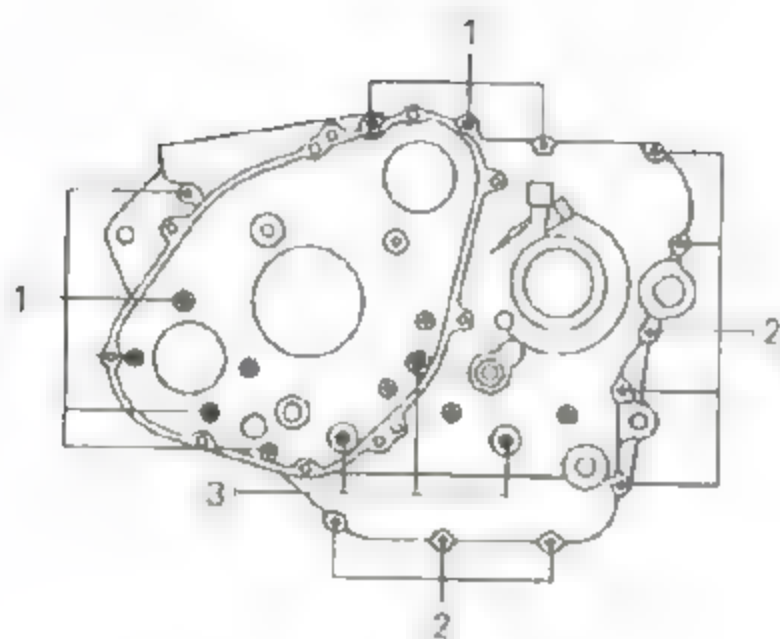
Crankshaft / Transmission

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8-2 CRANKSHAFT / TRANSMISSION

Exploded View





1. Crankcase Bolts (6 mm Dia. 50 mm Length)
2. Crankcase Bolts (6 mm Dia. 30 mm Length)
3. Crankcase Bolts (8 mm Dia. 80 mm Length)
4. Sealed Side

LG: Apply liquid gasket — black (Kawasaki Bond: 92104-1003) to the mating surface of the right and left crankcase halves.

L : Apply a non-permanent locking agent to the threads.

O : Apply engine oil to the surface.

G : Apply high temperature grease.

8-4 CRANKSHAFT / TRANSMISSION

Specifications

Item	Standard	Service Limit
Crankshaft, Connecting Rod:		
Connecting rod		
Big end radial clearance	0.008 ~ 0.020 mm	0.07 mm
Big end side clearance	0.25 ~ 0.35 mm	0.6 mm
Crankshaft runout		
Left half	Not more than 0.03 mm TIR	0.10 TIR
Right half	Not more than 0.04 mm TIR	0.10 TIR
Cold-fitting tolerance between crankpin and flywheel	0.093 ~ 0.122mm	-
Transmission:		
Gear backlash	0.06 ~ 0.23 mm	0.30 mm
Shift fork ear thickness	4.4 ~ 4.5 mm	4.3 mm
Gear shift fork groove width	4.55 ~ 4.65 mm	4.8 mm
Shift fork guide pin diameter	5.9 ~ 6.0 mm	5.80 mm
Shift drum groove width	6.05 ~ 6.20 mm	6.30 mm

Special Tools

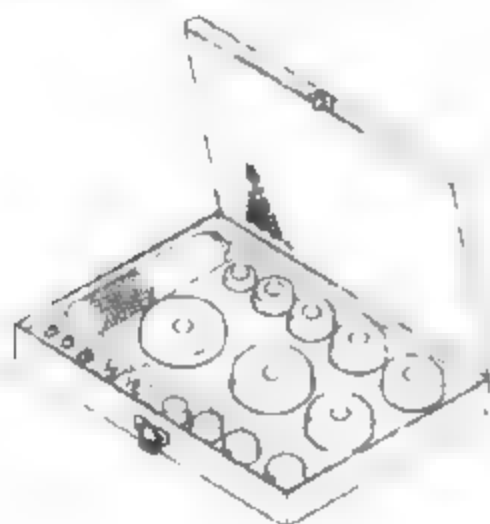
Outside Circlip Pliers: 57001-144



Crankshaft Jig: 57001-1174

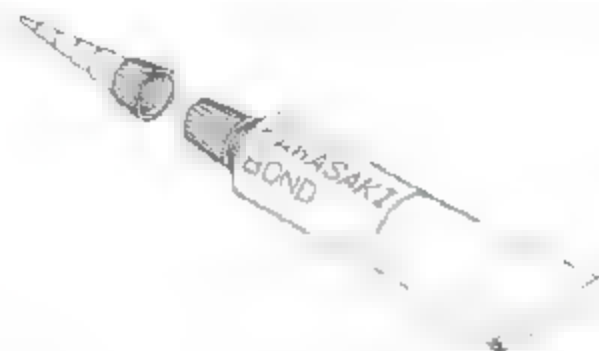


Bearing Driver Set 57001 1129



Sealant

Kawasaki Bond (Liquid Gasket Black): 92104 1003

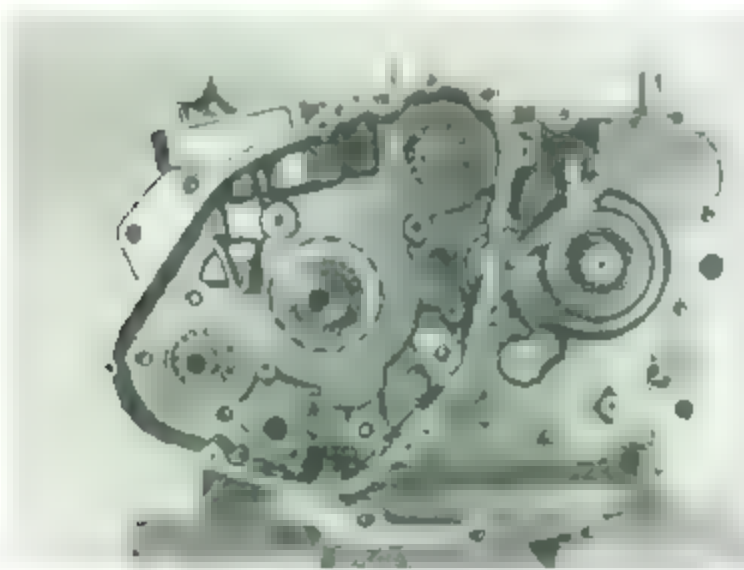


8-6 CRANKSHAFT / TRANSMISSION

Crankcase

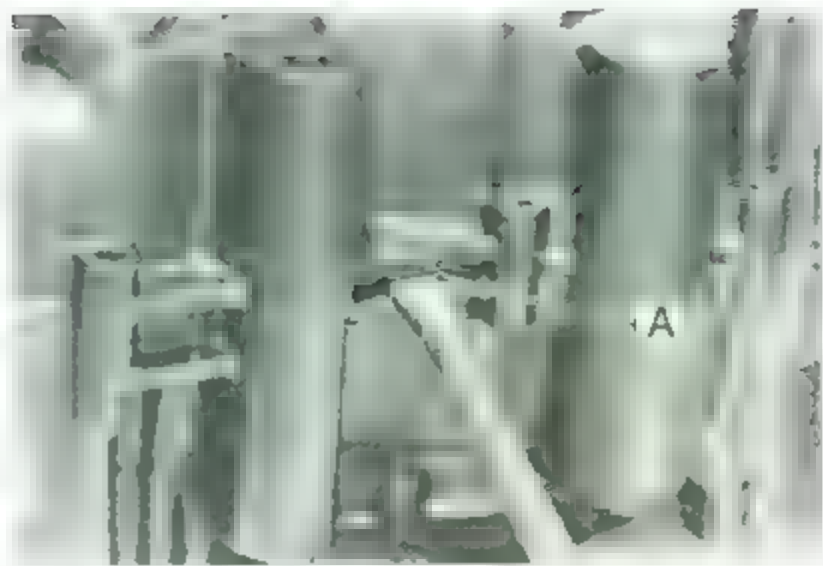
Splitting

- Remove the engine (see Engine Removal/Installation chapter)
- Set the engine on a clean surface while parts are being removed
- Remove
 - Cylinder Head Cover
 - Magneto Cover
 - Right Engine Cover
 - Cutch
 - Oil Pump and Oil Screen
 - Oil Pump Drive Gear and Primary Gear
 - External Shift Mechanism
 - Balancer Right Weight
 - Starter Mechanism
 - Camshaft Chain Tensioner
 - Camshafts
 - Magneto Flywheel and Starter Cutch
 - Left Engine Cover
 - Main Oil Pipe
 - Inside Balancer Chain Guide
 - Camshaft Chain
 - Camshaft Chain Tension Guide
 - Balancer Mechanism
 - Cylinder Head
 - Cylinder, Piston
- Remove the crankcase bolts.



A Crankcase Bolts

- Pry the points in the figure with a screwdriver to split the crankcase halves apart evenly. There are two knock pins on the crankcase mating surface. Pull off the left crankcase half



A Pry Point

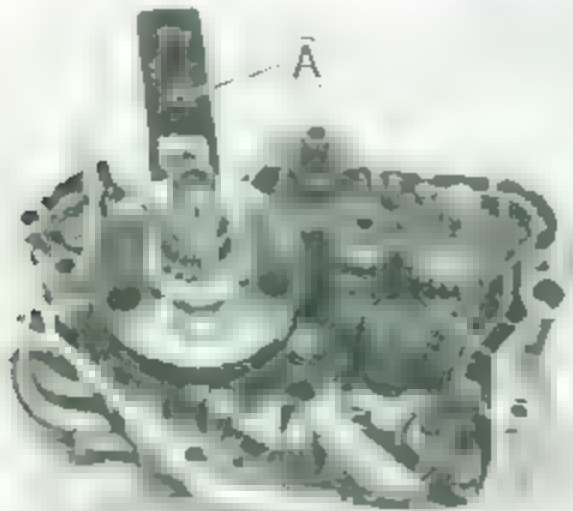
Assembly

- Before fitting the left case on the right case, note the following
 - Chip off the old gasket from the mating surfaces of the crankcase halves, and clean off the crankcase, transmission and crankshaft with a high flash point solvent. After cleaning, apply engine oil to the transmission gears, shift drum, shift forks, crankshaft and so on.
 - Be sure to replace any oil seal removed with a new one. Press in the new oil seal using a press and suitable tools so that the seal surface is flush with the surface of the crankcase.
 - Apply high temperature grease to the oil seal lips.
 - Press in the ball bearings and the collars using the bearing driver set (special tool: 57001-1129) until the bearing and the collars are bottomed.

CAUTION

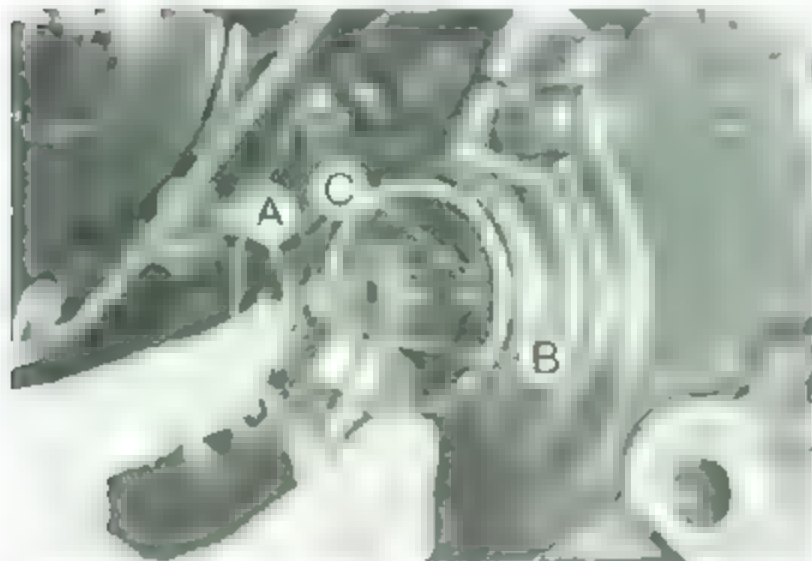
- Do not remove the bearings unless it is necessary. Removal may damage them.
- Install the bearing for the output shaft in the left crankcase so that its sealed side face toward the engine sprocket cover.
- Install the bearing for the rear balancer shaft in the left crankcase so that stepped side face toward the magneto cover.
- Apply a non-permanent locking agent to the threads of the bearing holding plate mounting screws for the crankshaft bearings in the both crankcase halves and the drive shaft bearing and the shift drum bearing in the right crankcase half.
- Replace the O-ring on the output shaft with a new one, install it securely on the shaft groove, and apply grease to the surface of it.
- After installing the output shaft in the right crankcase half, install the kick starter idle gear to prevent the needle bearing from falling off the output shaft during case assembly.
- Turn the crankshaft to BDC, and install the crankshaft jig (special tool) between the flywheels opposite the connecting rod big end to protect flywheel alignment as shown.

● If the crankshaft has been removed from the crankcase, install the jig (special tool) between the crankshaft flywheels before pressing the crankshaft into the right crankcase half



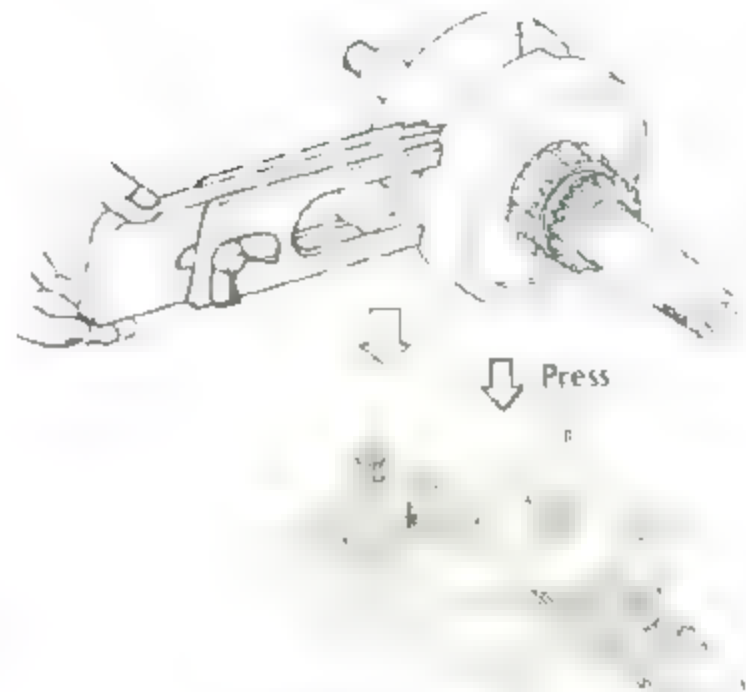
A. Crankshaft Jig 57001-1174

- Check to see that the crankcase knock pins are in place on the right crankcase half. If any of them has been removed, replace it with a new one.
- Apply liquid gasket – black (Kawasaki Bond 92104-1003) to the mating surface of the left crankcase half
- Constantly check the alignment of the two crankcase halves, and the position of the transmission shafts, and shift drum. The front and rear of the crankcase must be pushed together evenly.
- Apply grease to the inside of output shaft collar and install it by hand on the output shaft so that the oil groove goes first and collar does not pinch the O-ring

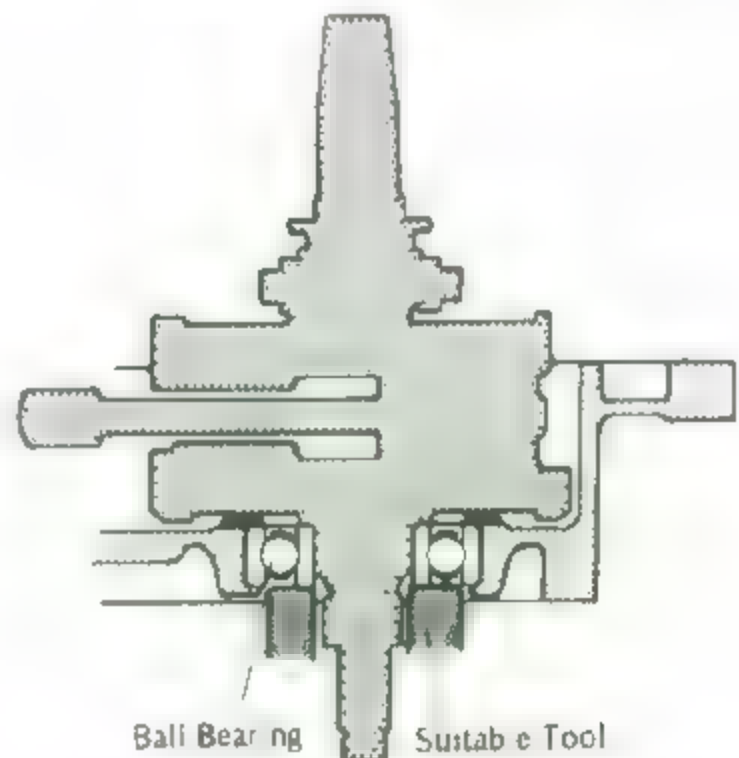


A. Collar
B. Oil Groove
C. O-ring

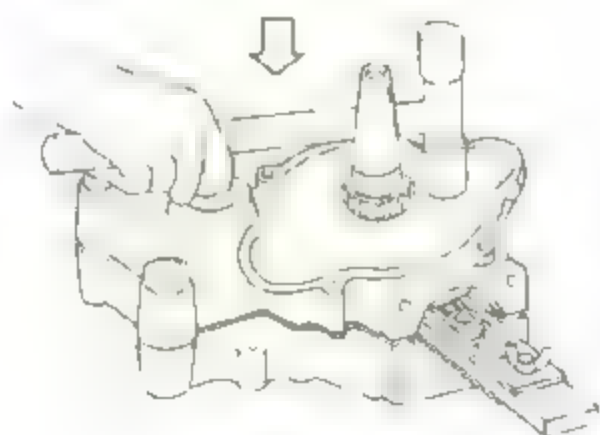
- Check to see that the crankshaft, drive shaft, and output shaft all turn freely (in the neutral position)
- Spinning the output shaft, shift the transmission through all the gears to make certain there is no binding and that all the gears shift properly



Right Crankcase



Ball Bearing Sustain Tool



8-8 CRANKSHAFT / TRANSMISSION

Crankshaft, Connecting Rod

Crankshaft Disassembly Note

Since assembly of the crankshaft demands exacting tolerances, the disassembly and reassembly of the crankshaft can only be done by a shop having the necessary tools and equipment.

The crankshaft left main bearing, chain sprockets, and left crankshaft are available separately as spare parts, however, it is recommended that the crankshaft assembly be replaced rather than attempting to replace the components.

Crankshaft Assembly Notes

Since assembly of the crankshaft demands exacting tolerances, the disassembly and reassembly of the crankshaft can only be done by a shop having the necessary tools and equipment.

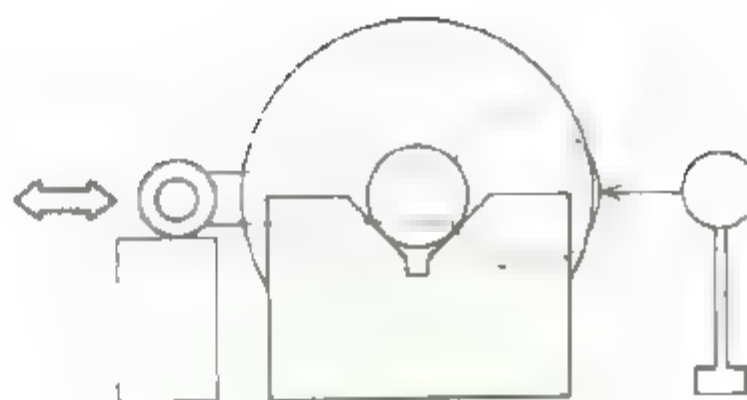
- Reassemble the crankshaft according to the standard tolerances in Specifications.
 - Connecting rod big end radial clearance
 - Cold fitting tolerance between crankpin and flywheels.
 - Side clearance between the connecting rod and one of the flywheels.
 - Crankshaft runout.
- Make sure oil passages of crank and crank pin are lined up during assembly.
- Apply a locking agent to the oil plugs and push them until they stop at the bottom of the hole.
- Press the camshaft chain sprocket onto the crankshaft as shown.

Connecting Rod Big End Radial Clearance

- Set the crankshaft in flywheel alignment jig or on V blocks, and place a dial gauge against the big end of the connecting rod.
- Push the connecting rod first towards the gauge and then in the opposite direction. The difference between the two gauge readings is the radial clearance.
- ★ If the radial clearance exceeds the service limit, the crankshaft should be either replaced or disassembled and the crankpin, needle bearing, and connecting rod big end examined for wear.

Connecting Rod Big End Radial Clearance

Standard: 0.008 ~ 0.020 mm
Service Limit: 0.07 mm



Connecting Rod Big End Seizure

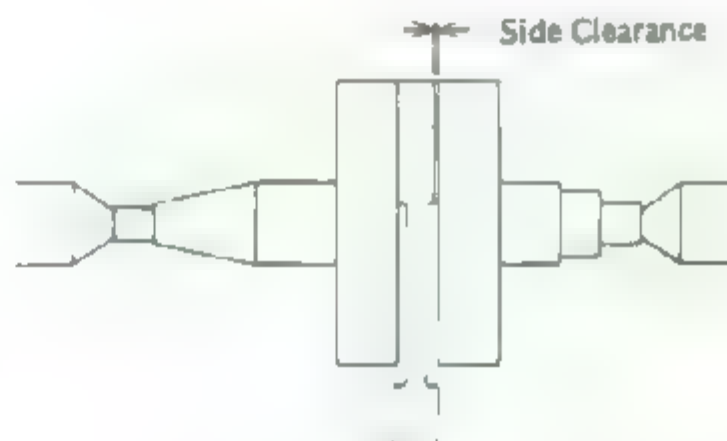
- ★ In case of serious seizure with damaged flywheels, the crankshaft must be replaced.
- ★ In case of less serious damage, disassemble the crankshaft and replace the crankpin, needle bearing, side washers, and connecting rod.

Connecting Rod Side Clearance

- Measure the side clearance of the connecting rod with a thickness gauge.
- ★ If the clearance exceeds the service limit, replace the crankshaft.

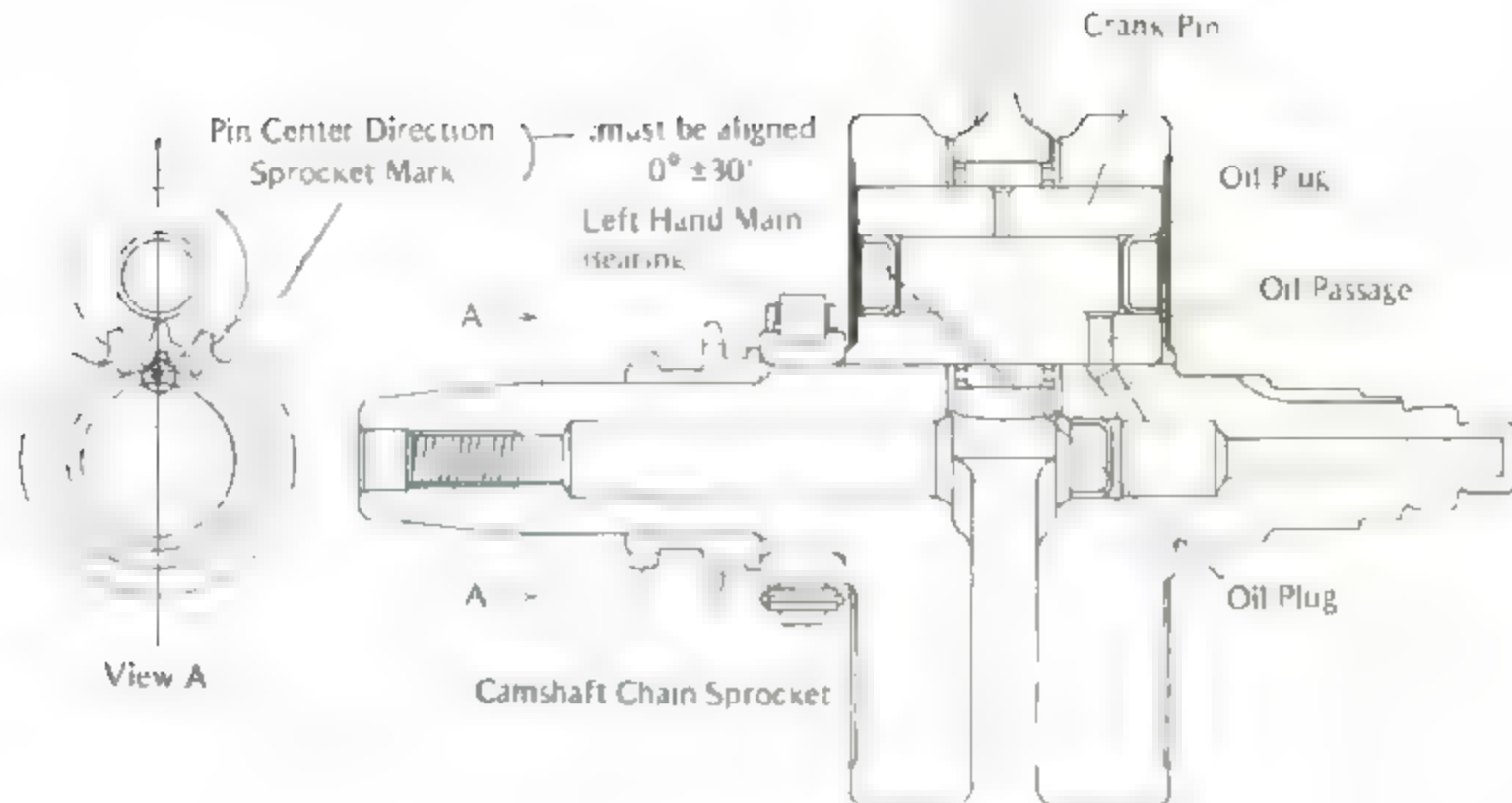
Connecting Rod Side Clearance

Standard: 0.25 ~ 0.35 mm
Service Limit: 0.6 mm



Crankshaft Runout

- Set the crankshaft in a flywheel alignment jig and place a dial gauge at the ball bearing (B) and at the sprocket (A).
- Turn the crankshaft slowly. The maximum difference in gauge readings is the crankshaft runout.
- ★ If the runout at either point exceeds the service limit, align the flywheels so that the runout falls within the service limit.



Crankshaft Runout

Left Half (A)

Standard:

Not more than 0.03 mm TIR

Service Limit:

0.10 mm TIR

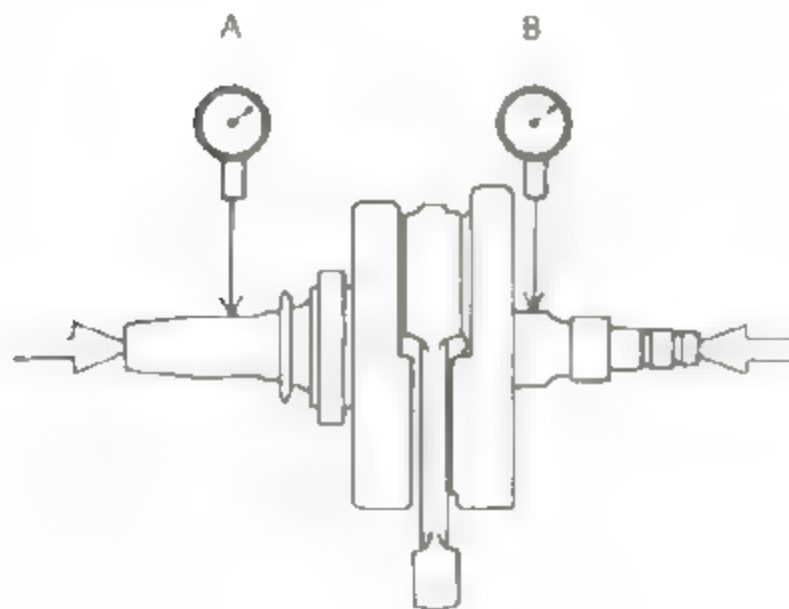
Right Half (B)

Standard:

Not more than 0.04 mm TIR

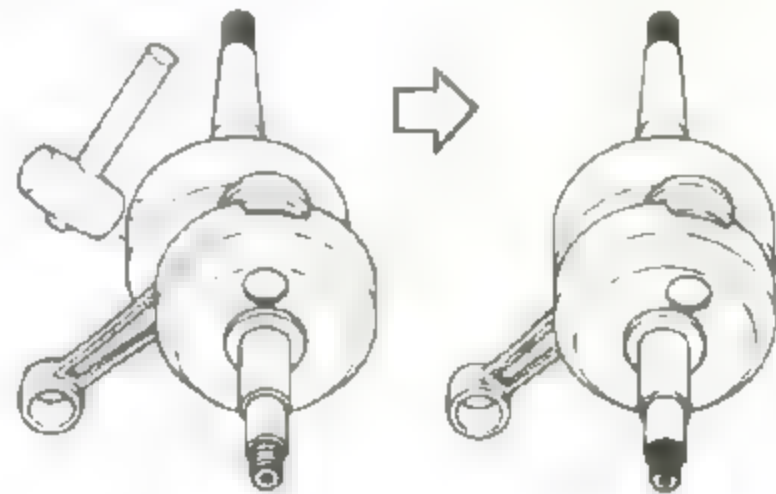
Service Limit:

0.10 mm TIR



Crankshaft Alignment

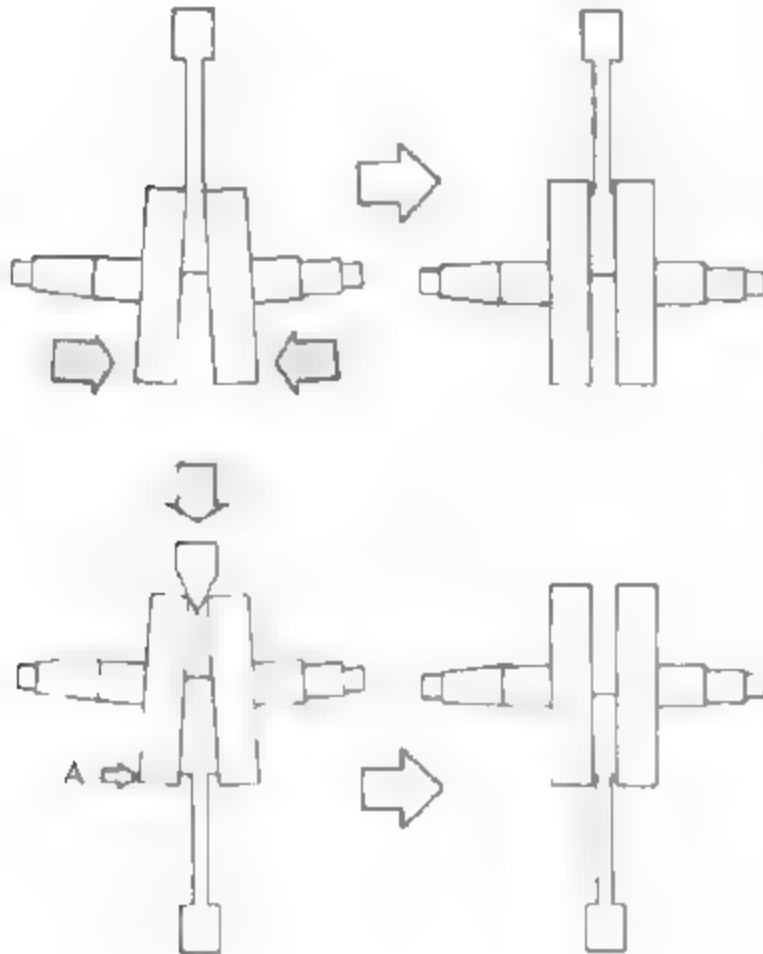
- In the case of horizontal misalignment, which is the most common, strike the projecting rim of the flywheel with a plastic, soft lead or brass hammer as indicated in the figure.
- Redcheck the runout with a dial gauge, repeating the process until the runout falls within the service limit.
- Vertical misalignment is corrected either by driving a wedge in between the flywheels or by squeezing the flywheel rims in a vise, depending on the nature of the misalignment. In both cases of horizontal and vertical misalignment, correct the horizontal misalignment first.
- ★ If flywheel misalignment cannot be corrected by the above method, replace the crankpin or the crankshaft itself.



8-10 CRANKSHAFT / TRANSMISSION

CAUTION

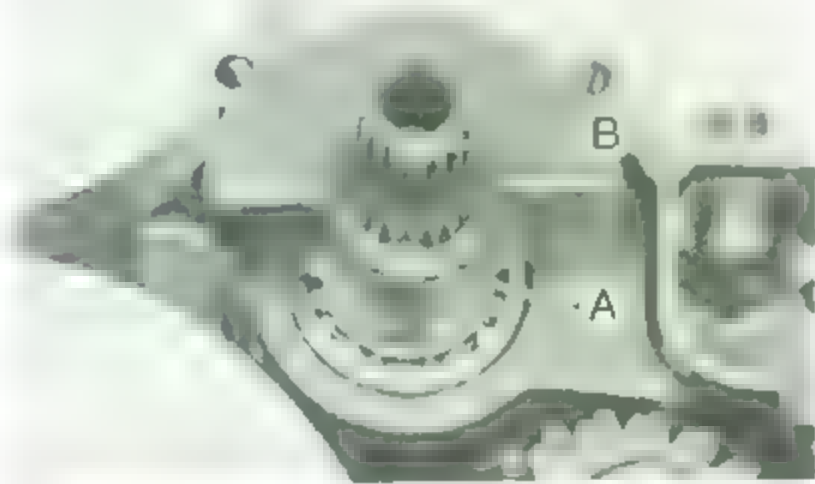
○ Don't hammer the flywheel at point "A".



Balancer

Rear Balancer Installation Notes

- Install the rear balancer weight on the balancer shaft aligning the weight punch mark with the shaft punch mark



A Weight Punch Mark B Shaft Punch Mark

- Prior to putting the rear balancer shaft into the crankcase, be sure to install the washer and circlip (see Exploded View)

Roller Bearing Wear, Damage

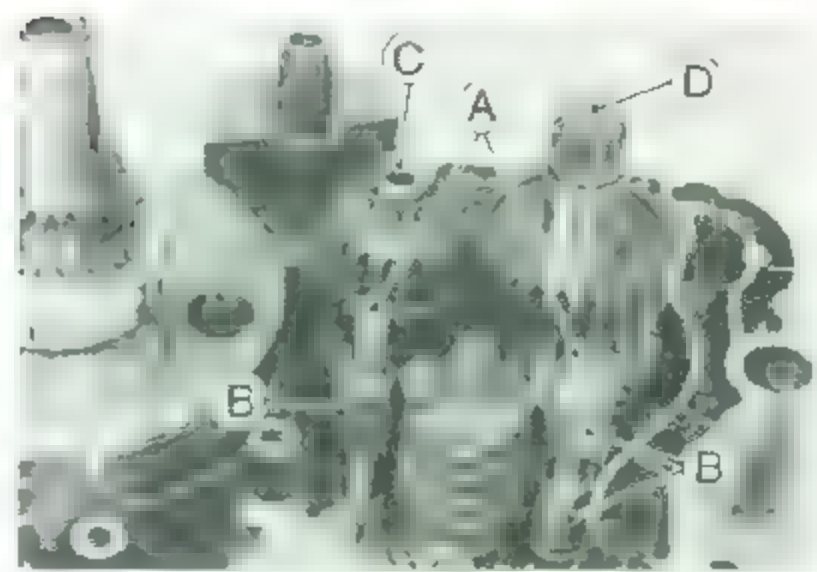
The rollers of the bearing wear so little that the wear is difficult to measure

- Inspect the bearing for abrasion, color change, or other damage
- ★ If there is any doubt as to the condition of the rollers, replace the left crankshaft or the crankshaft assembly.
- Inspect the bearing outer race in the left crankcase half
- ★ If there is any damage on the outer race, replace the crankcases as a unit.

Transmission

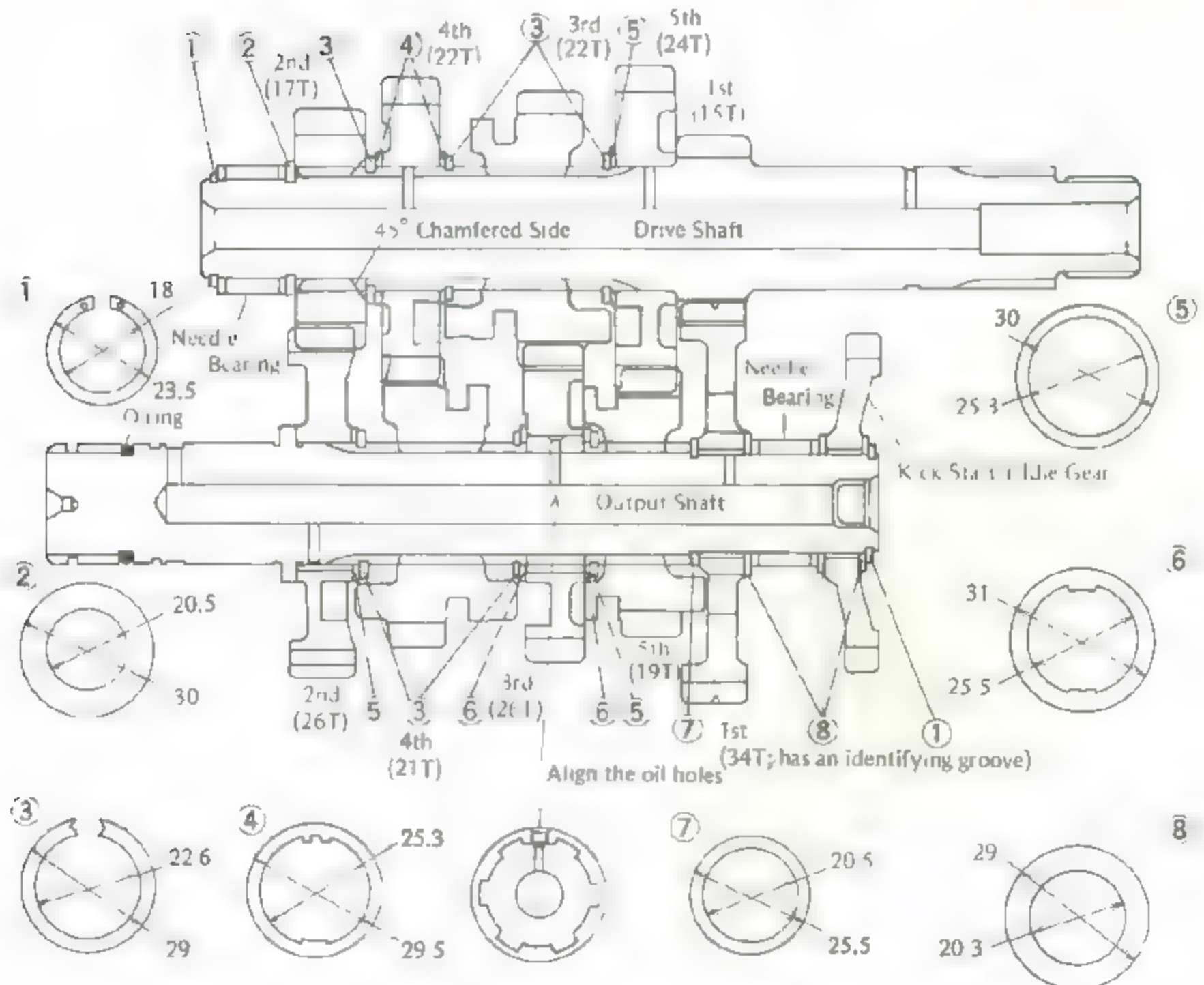
Transmission Shaft Removal

- Split the crankcase (see Crankcase Splitting)
- Pull off the shift rods, and disengage the shift fork guide pins from the shift drum grooves
- Take off the shift drum.
- Remove the shift forks from the transmission gears
- Take out the drive shaft and output shaft together with their gears meshed



A Shift Rods
B Shift Forks

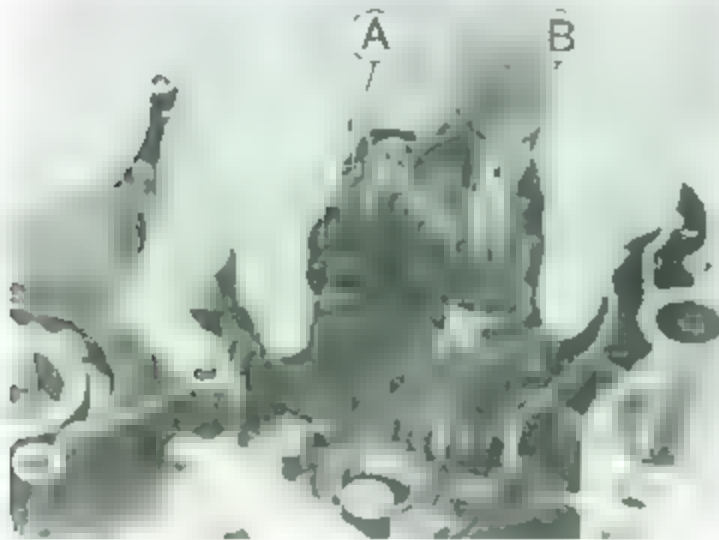
C Drive Shaft
D Output Shaft



8-12 CRANKSHAFT / TRANSMISSION

Transmission Shaft Installation Notes

- Hold the drive shaft and output shaft together, with their gears meshed, and fit them into the right crankcase half



A Drive Shaft

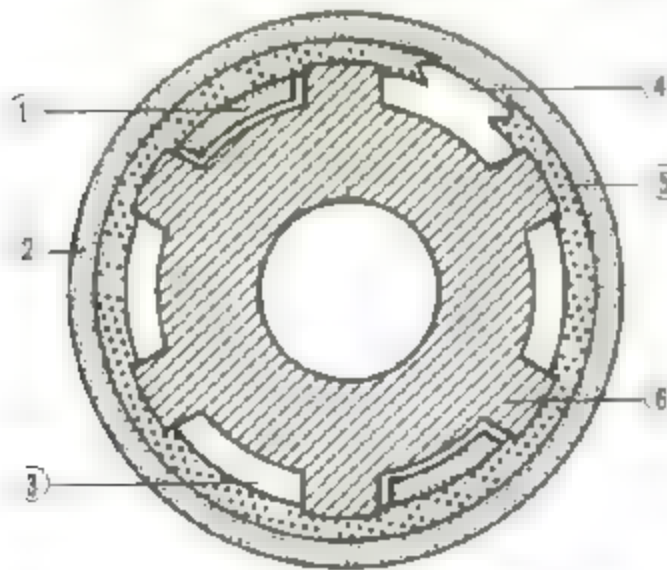
B. Output Shaft

Transmission Shaft Disassembly Note

- Using the outside circlip pliers (special tool 57001-144) to remove the circlips, disassemble the transmission shaft

Transmission Shaft Assembly Notes

- Apply engine oil liberally to the transmission shaft, gears and bearings
- Replace any circlips that were removed with new ones
- Always install circlips so that the opening is aligned with a spline groove, and install toothed washers so that the teeth are not aligned with the circlip opening. To install a circlip without damage, first fit the circlip onto the shaft expanding it just enough to install it, and then use a suitable gear to push the circlip into place

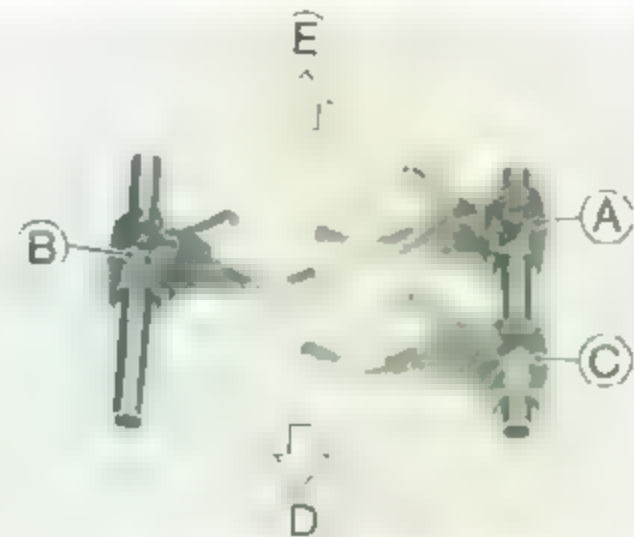


1. Teeth of Toothed Washer 4. Opening of Circlip
2. Toothed Washer 5. Circlip
3. Groove of Shaft 6. Shaft

- Be sure that all parts are put back in the correct sequence, facing the proper direction, and that all circlips and the washer are properly in place
- Check that each gear spins or slides freely on the transmission shaft without binding after assembly

Shift Drum and Fork Installation Notes

- Apply a little engine oil to the shift fork ears, and fit the shift forks into the gear grooves



- A. Output Shaft 4th Gear Shift Fork
B. Drive Shaft 3rd Gear Shift Fork
C. Output Shaft 5th Gear Shift Fork
D. Right Crankcase Half Side
E. Left Crankcase Half Side

Shift Fork Identification

Output shaft 4th gear shift fork	pin is on fork rib
Drive shaft 3rd gear shift fork	ears are shorter than those of the other two shift forks
Output shaft 5th gear shift fork	pin is on fork line

- Fit the shift fork guide pins into the corresponding shift drum grooves
- Apply a little engine oil to the shift rods, and slide them into the shift forks

Shift Fork Bending

- Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.



A 90°

Shift Fork/Gear Groove Wear

- Measure the thickness of the shift fork ears, and measure the width of the shift fork grooves in the transmission gears.
- ★ If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

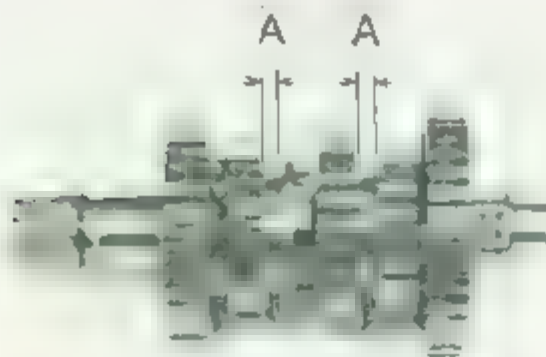
Shift Fork Ear Thickness

Standard: 4.4 ~ 4.5 mm
Service Limit: 4.3 mm

- ★ If a gear shift fork groove is worn over the service limit, the gear must be replaced.

Gear Shift Fork Groove Width

Standard: 4.55 ~ 4.65 mm
Service Limit: 4.8 mm



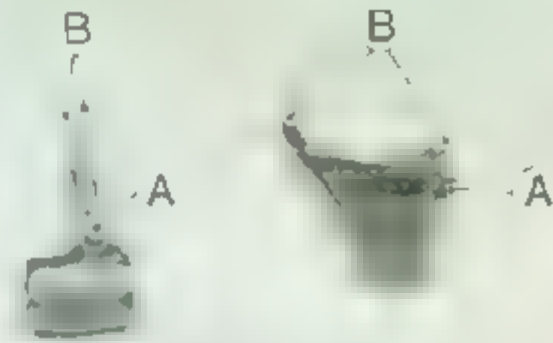
A. Gear Shift Fork Groove

Shift Fork Guide Pin/Shift Drum Groove Wear

- Measure the diameter of each shift fork guide pin, and measure the width of each shift drum groove.
- ★ If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

Shift Fork Guide Pin Diameter

Standard: 5.9 ~ 6.0 mm
Service Limit: 5.80 mm



A Shift Fork Guide Pin B Shift Fork Ears

- ★ If any shift drum groove is worn over the service limit, the drum must be replaced.

Shift Drum Groove Width

Standard: 6.06 ~ 6.20 mm
Service Limit: 6.30 mm

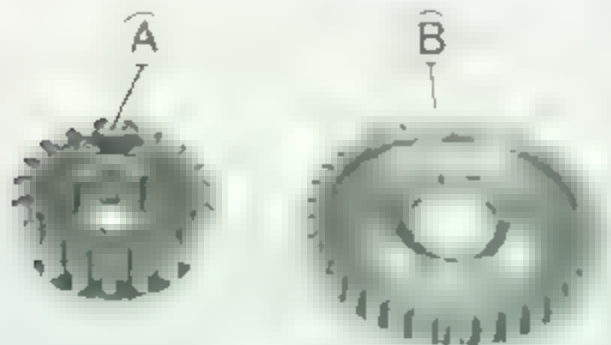


A. Shift Drum Grooves

8-14 CRANKSHAFT / TRANSMISSION

Gear Dog/Gear Dog Hole Damage

- Visually inspect the gear dogs and gear dog holes
- ★ Replace any damaged gears or gears with excessively worn dogs or dog holes



A. Dog

B. Dog Hole

Ball and Needle Bearing Wear

- Check the ball bearings and the needle bearings on both sides of the shift drum, drive shaft and output shaft
- Since the ball bearings and the needle bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in a high flash point solvent, dry it (do not spin the bearing while it is dry), and oil it with engine oil
- Spin the bearings by hand to check its condition.
- ★ If the bearings are noisy, do not spin smoothly, or have any rough spots, replace them.

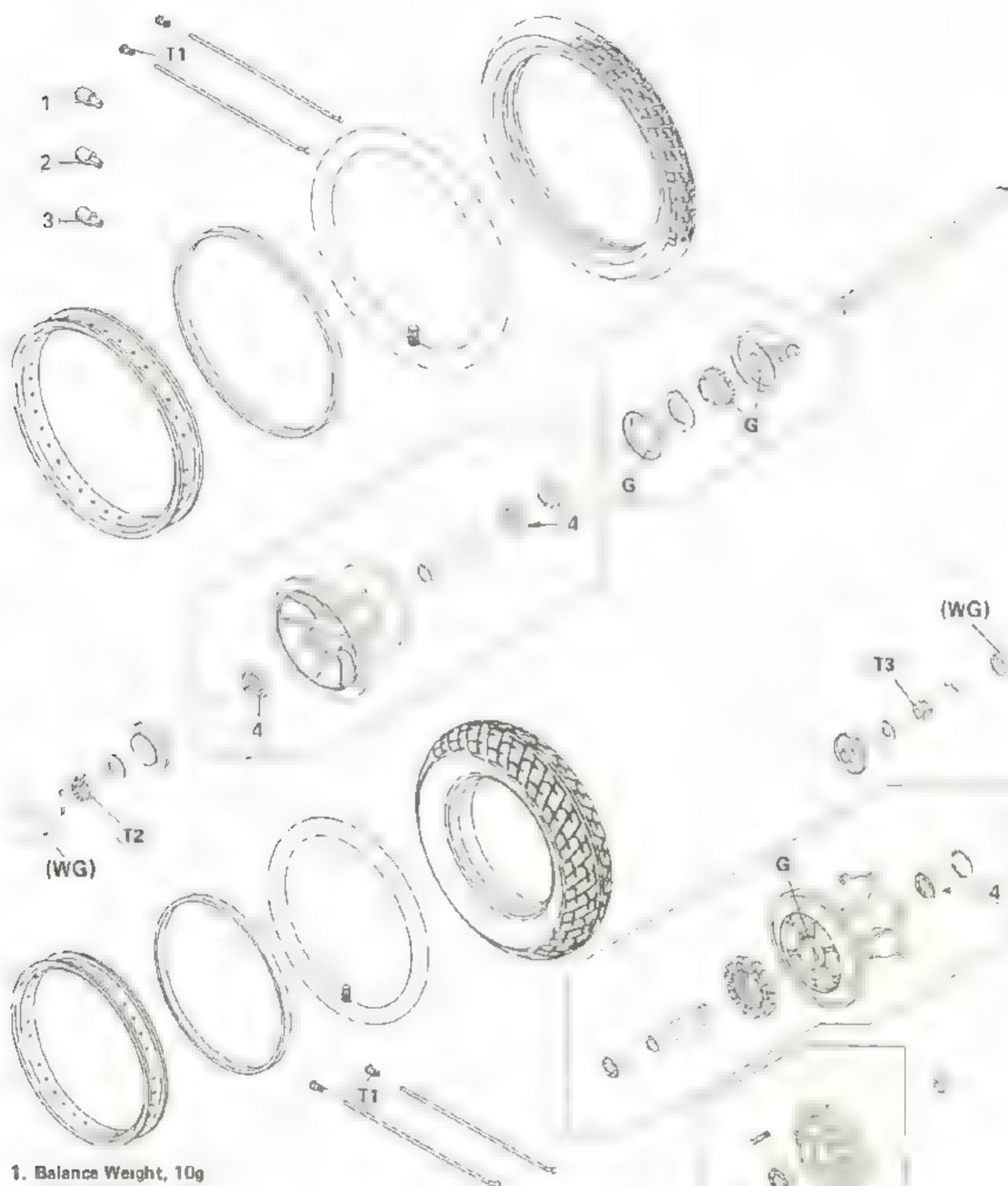
Wheels / Tires

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9 2 WHEELS / TIRES

Exploded View



1. Balance Weight, 10g

2. Balance Weight, 20g

3. Balance Weight, 30g

4. Sealed Side

G : Apply grease.

WG: West German Model

T1: 2.0 ~ 3.9 N·m (0.2 ~ 0.4 kg·m, 17 ~ 35 in·lb)

T2: 78 N·m (8.0 kg·m, 58 ft·lb)

T3: 93 N·m (9.5 kg·m, 69 ft·lb)

Specifications

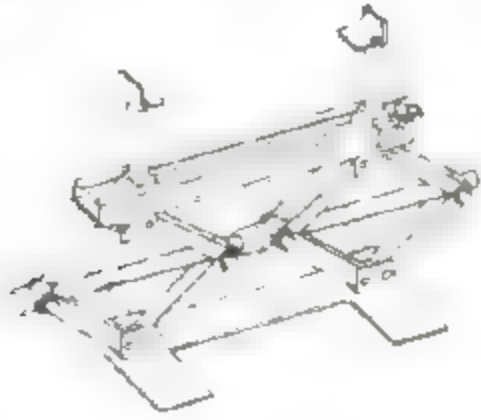
Item		Standard	Service Limit
Wheels:			
Rim runout (with tire installed):			
	Axial	---	2 mm
	Radial	---	2 mm
Axle runout/100 mm		Under 0.05 mm	0.2 mm (0.7 mm RL)
Tires			
Air pressure (when cold):			
	Front	150 kPa (1.5 kg/cm ² , 21 psi)	-
	Rear	Up to 97.5 kg (215 lb) load 150 kPa (1.5 kg/cm ² , 21 psi) 97.5 ~ 182 kg (215 ~ 401 lb) load 200 kPa (2.0 kg/cm ² , 28 psi)	--- ---
Tread Depth:			
	Front	6.4 mm	2 mm
	Rear	8.8 mm	2 mm
Standard Tire:			
	Front:	Size Make Type	--- -- -
	Rear	Size Make Type	- --- ---
		90/90-21 54S DUNLOP K750, TRAIL MAX 130/80-17 65S DUNLOP K750, TRAIL MAX	

RL: Repair Limit

9-4 WHEELS / TIRES

Special Tools

Jack Stand 57001-1238



Bead Breaker Assembly: 57001 1072



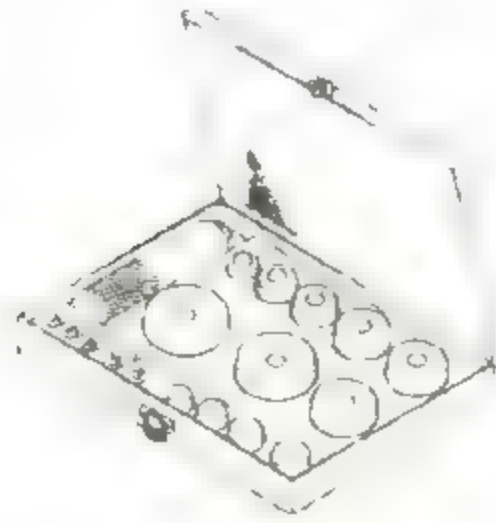
Rim Protector 57001-1063



Tire Iron: 57001 1073



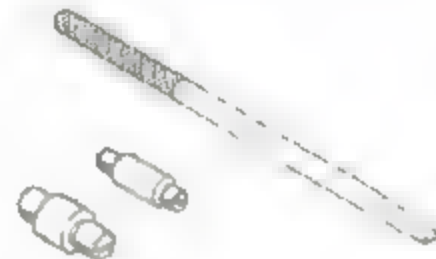
Bearing Driver Set: 57001-1129



Inside Circlip Pliers: 57001-143



Bearing Remover Set: 57001-1264



Wheels

Front Wheel Removal

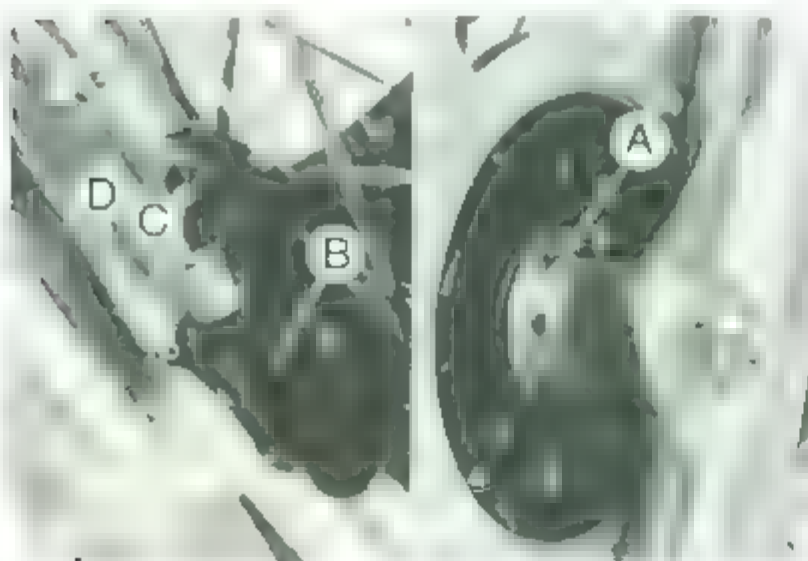
- Remove
 - Disc Cover
 - Speedometer Cable Lower End
 - Cotter Pin, Axle Nut, Washer
 - Lower Faring
- Using the jack stand (special tool 57001-1238), raise the front wheel off the ground
- Pull out the axle, and remove the wheel

CAUTION

- Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground

Front Wheel Installation Notes

- Install the collar on the left side of the hub
- Install the speedometer gear housing so that it fits in the speedometer gear drive notches
- Fit the speedometer gear housing stop to the fork leg stop



A Collar C Housing Stop
B Speedometer Gear Housing D Fork Leg Stop

- Tighten the axle nut to the specified torque (see Exploded View)
- Install a new cotter pin
- Check the front brake

WARNING

- Do not attempt to drive the motorcycle until a full brake lever is obtained by pumping the brake lever until the pads are against the disc. The brake will not function on the first application of the lever if this is not done

Rear Wheel Removal

- Remove
 - Disc Cover
 - Caliper (with the brake hose connected)
 - Cotter Pin, Axle Nut
 - Chain Adjuster Lock Nut, Adjusting Nut (turn out fully)
 - Chain Cover
 - Chain (disengage)
 - Lower Faring
- Using the jack stand (special tool 57001-1238), raise the rear wheel off the ground
- Pull out the axle, and remove the wheel

CAUTION

- Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground

Rear Wheel Installation Notes

- Adjust the drive chain slack (see Drive Chain Slack Inspection in the Final Drive chapter)
- Tighten the axle nut to the specified torque (see Exploded View)
- Install a new cotter pin.
- Tighten the caliper mounting bolts to the specified torque (see Exploded View in the Brakes chapter)
- Check the rear brake.

WARNING

- Do not attempt to drive the motorcycle until a full brake pedal is obtained by pumping the brake pedal until the pads are against the disc. The brake will not function on the first application of the pedal if this is not done

Alignment Inspection

- Refer to Wheel Alignment Inspection in the Final Drive chapter

Alignment Adjustment

- Refer to Wheel Alignment Adjustment in the Final Drive chapter

9-6 WHEELS / TIRES

Inspection

- Remove the lower fairing
- Using the jack stand (special tool 57001-1238) raise the rear wheel off the ground
- Spin the wheel lightly, and check for roughness or binding.
- ★ If roughness or binding is found, replace or lubricate the hub bearings
- Visually inspect the front and rear axles for damages
- ★ If axle is damaged or bent, replace it

Spoke Inspection

- Check that all the spokes are tightened evenly
- ★ If spoke tightness is uneven or loose, tighten the spoke nipples to the specified torque evenly (see Exploded View).
- Check the rim runout

WARNING

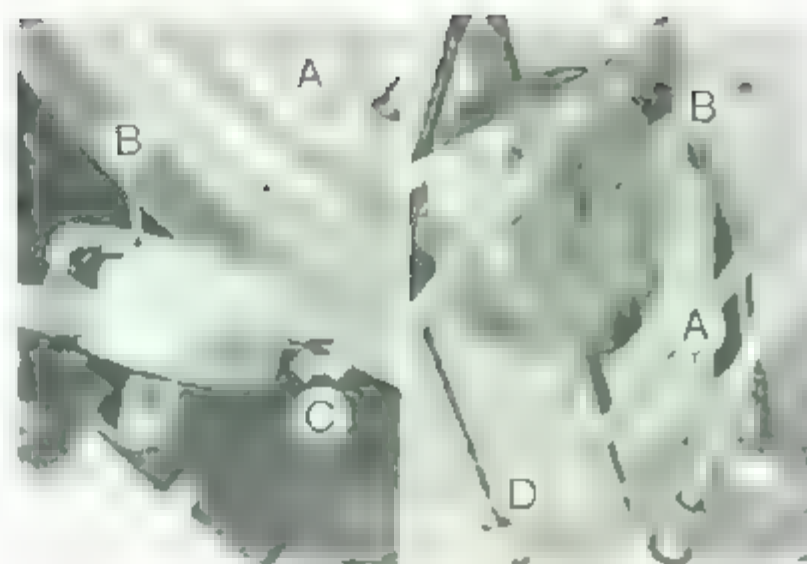
- If any spoke breaks, it should be replaced immediately. A missing spoke places an additional load on the other spokes, which will eventually cause other spokes to break.

Rim Inspection

- Remove the lower fairing
- Using the jack stand (special tool 57001-1238), raise the front/rear wheel off the ground
- Inspect the rim for small cracks, dents, bending or warping
- ★ If there is any damage to the rim, it must be replaced
- Set a dial gauge against the side of the rim, and rotate the rim to measure the axial runout. The difference between the highest and lowest dial readings is the amount of runout
- Set a dial gauge against the outer circumference of the rim, and rotate the rim to measure radial runout. The difference between the highest and lowest dial readings is the amount of runout.
- ★ If rim runout exceeds the service limit, check the wheel bearings first. Replace them if they are damaged. If the problem is not due to the bearings, correct the rim warp (runout). A certain amount of rim warp can be corrected by recentering the rim. Loosen some spokes and tighten others within the standard torque to change the position of different parts of the rim. If the rim is badly bent, however, it must be replaced.

Rim Runout (with tire installed)

	Service Limit
Axial	2 mm
Radial	2 mm



A Rim

B Dial Gauge

C Axial Rim Runout

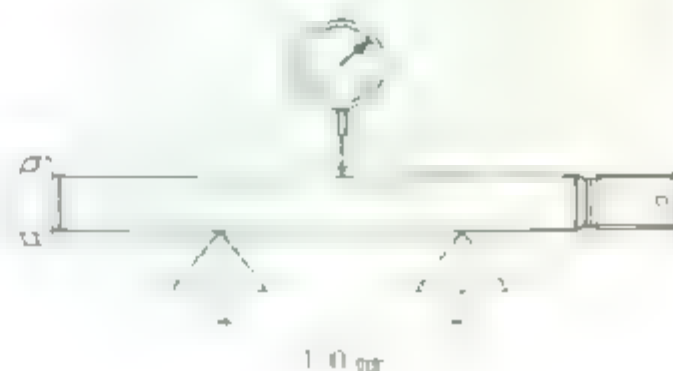
D Radial Rim Runout

Axle Inspection

- Place the axle in V blocks that are 100 mm apart, and set a dial gauge on the axle at a point halfway between the blocks. Turn the axle to measure the runout. The difference between the highest and lowest dial readings is the amount of runout
- ★ If runout exceeds the repair limit, replace it.
- ★ If runout only exceeds the service limit, straighten the axle
- ★ If the axle cannot be straightened to within service limit, replace the axle

Axle Runout/100 mm

Standard	Under 0.05 mm
Service Limit:	0.2 mm
Repair Limit:	0.7 mm



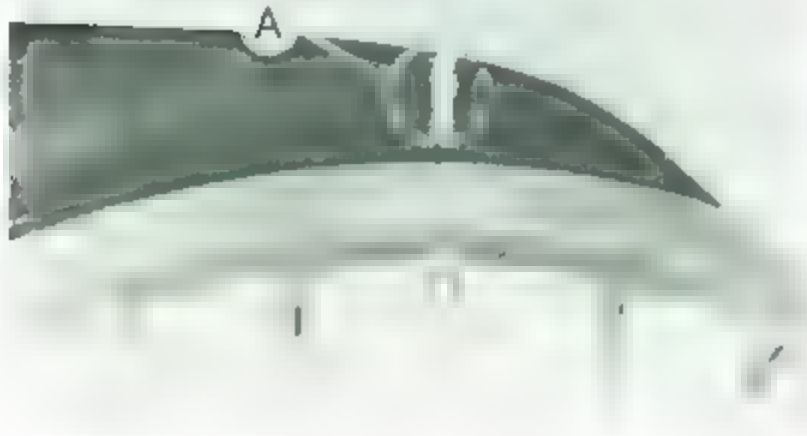
Front Wheel Balance

To improve stability and decrease vibration at high speed, the front wheel must be kept balanced.

Check and balance the front wheel when required, or when a tire and/or rim is replaced with a new one.

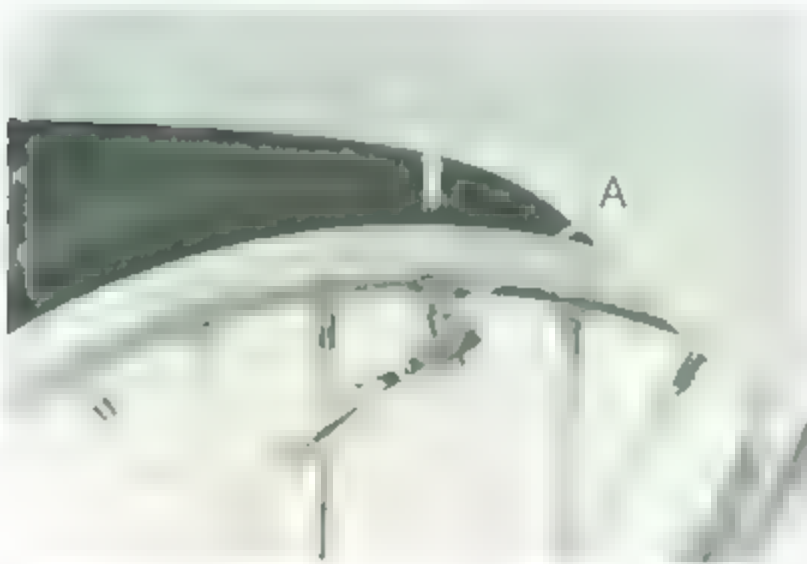
- Check that all the spokes are tightened evenly and
- Remove the lower fairing
- Using the jack stand (special tool 57001-1238), raise the front wheel off the ground.
- Check that all spokes are tightened evenly and the rim runout is within the service limit

- Spin the wheel lightly, and mark the wheel at the top when the wheel stops



A. Mark at the top.

- Repeat this procedure several times
- ★ If the wheel stops of its own accord in various positions, it is well balanced
- ★ If the wheel always stops in one position, balance the wheel
- Temporarily attach a balance weight on the wheel
- Attach a balance weight loosely to the spoke under the marking



A. Balance Weight

- Rotate the wheel $\frac{1}{4}$ turn, and see whether or not the wheel stays in this position
- ★ If it does, the correct balance weight is being used



A. $\frac{1}{4}$ turn

- ★ If the wheel rotates and the weight goes up, replace the weight with the next heavier size
- ★ If the wheel rotates and the weight goes down, replace the weight with the next lighter size
- Repeat these steps until the wheel remains at rest after being rotated $\frac{1}{4}$ turn
- Rotate the wheel another $\frac{1}{4}$ turn and then another $\frac{1}{4}$ turn to see if the wheel is correctly balanced
- Repeat the entire procedure as many times as necessary to achieve correct wheel balance
- Install the balance weight firmly on the wheel
- Clamp on the balance weight firmly using pliers.

NOTE

- Balance weights are available from Kawasaki Dealers in 10, 20, and 30 gram sizes. An imbalance of less than 10 grams will not usually affect running stability
- Do not use four or more balance weights (more than 90 g). If the wheel requires an excess balance weight, remove and disassemble the wheel to find the cause

9-8 WHEELS / TIRES

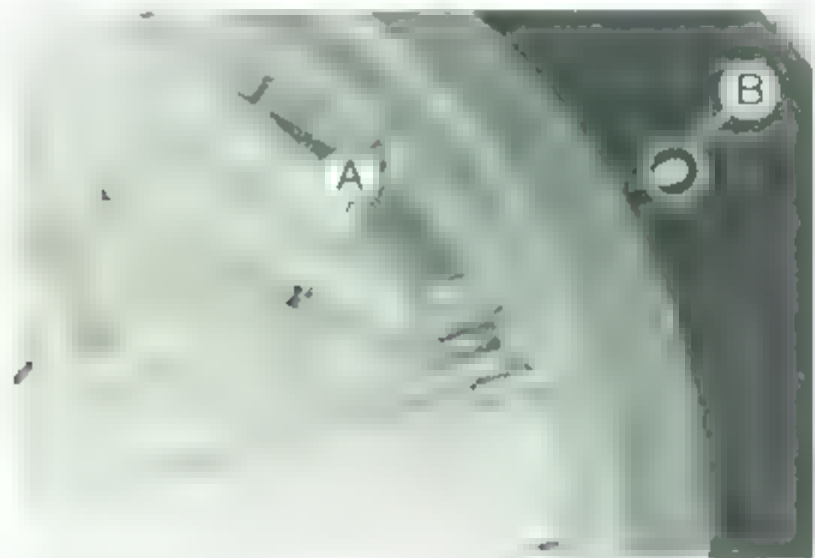
Tires

Removal

CAUTION

○ Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground

- Remove the wheel from the motorcycle (see Wheels)
- To maintain wheel balance, mark the valve stem position on the tire with chalk so that the tire can be reinstalled in the same position
- Take out the valve core to let out the air

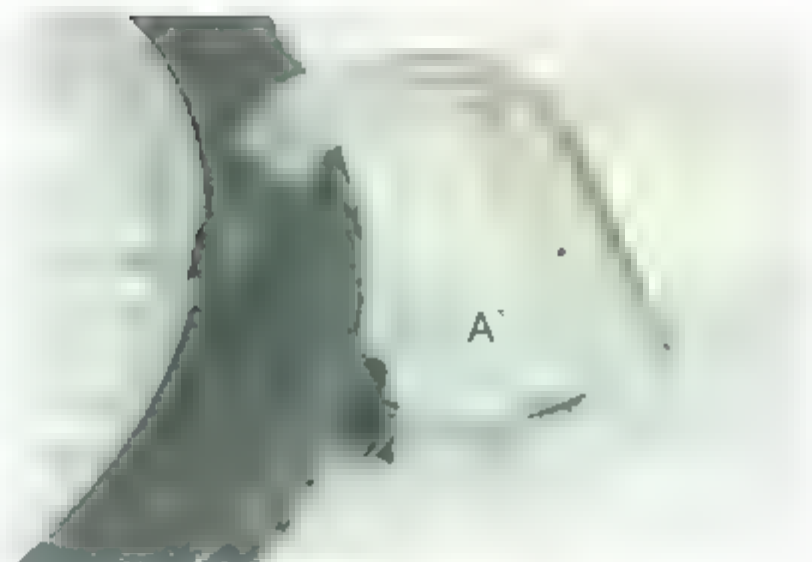


A. Unscrew valve core B. Mark valve stem position

- When handling the rims, be careful not to damage the aluminum rim flanges
- Lubricate the tire beads and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges

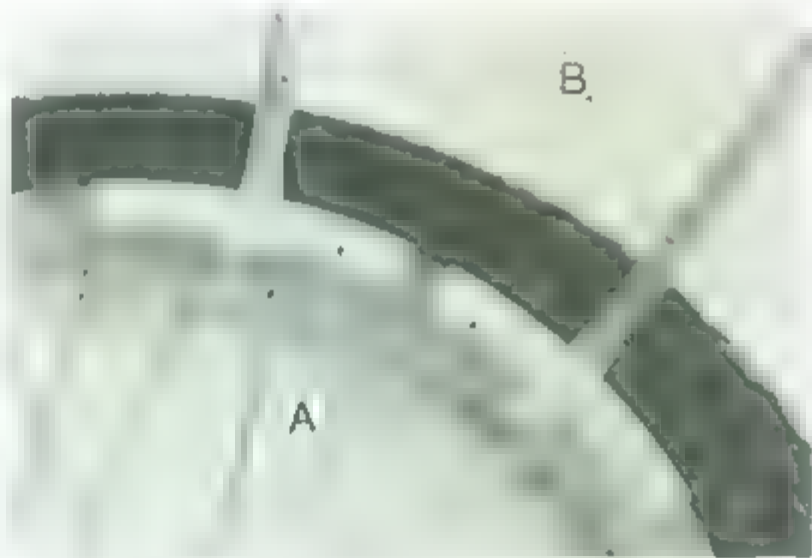
CAUTION

- Never lubricate with mineral oil (engine oil) or gasoline because they will cause deterioration of the tire.
- Break the beads away from both sides of the rim with the bead breaker assembly (special tool)



A. Bead Breaker Assembly 57001-1072

- Pry the tire off the rim with tire iron (special tool) protecting the rim with rim protector (special tool)



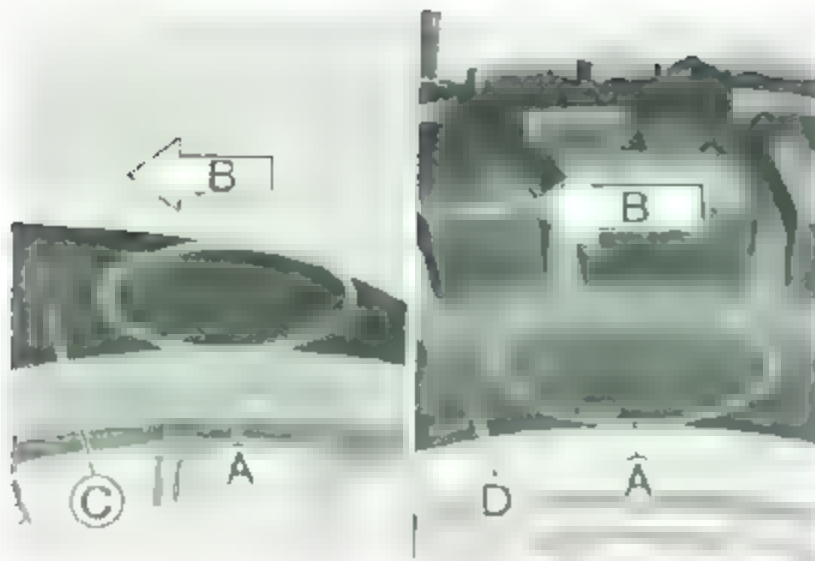
A. Rim Protector 57001-1063
B. Tire Iron 57001-1073

Installation Notes

- Check the tire rotation mark on the front/rear tire and install it on the rim accordingly

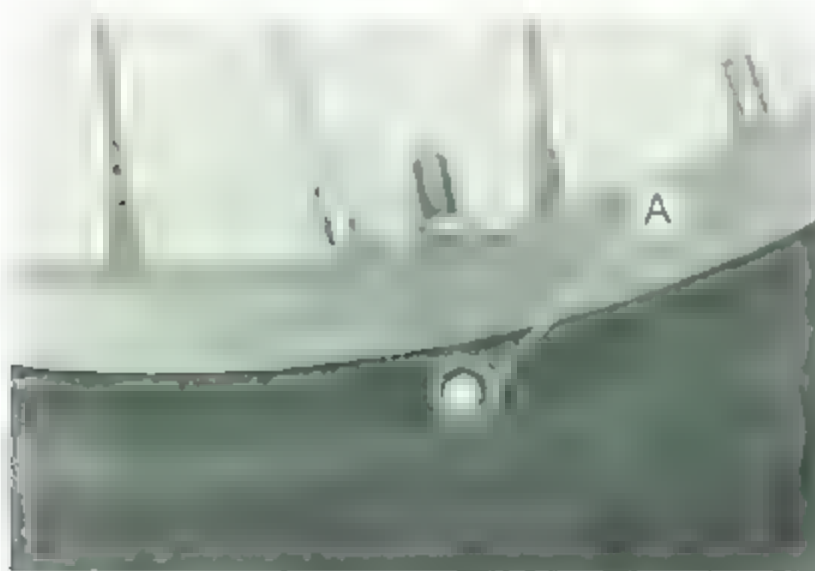
NOTE

- The direction of the tire rotation is shown by an arrow on the tire sidewall



A. Arrow Mark (Rotation Mark)
B. Rotating Direction
C. Front Tire
D. Rear Tire

- Position the tire on the rim so that the valve is at the tire balance mark (the chalk mark made during removal or the yellow paint mark on a new tire).



A. Balance Mark

- Check and adjust the air pressure after installing

Air Pressure Inspection/Adjustment

- Using an air pressure gauge, measure the tire air pressure when the tires are cold
- ★ Adjust the tire air pressure according to the following specifications, if necessary

Air Pressure (when cold)

Front:	150 kPa (1.5 kg/cm ² , 21 psi)
Rear:	Up to 97.5 kg (215 lb) load:
	150 kPa (1.5 kg/cm ² , 21 psi)
	97.5 ~ 182 kg (215 ~ 401 lb) load:
	200 kPa (2.0 kg/cm ² , 28 psi)

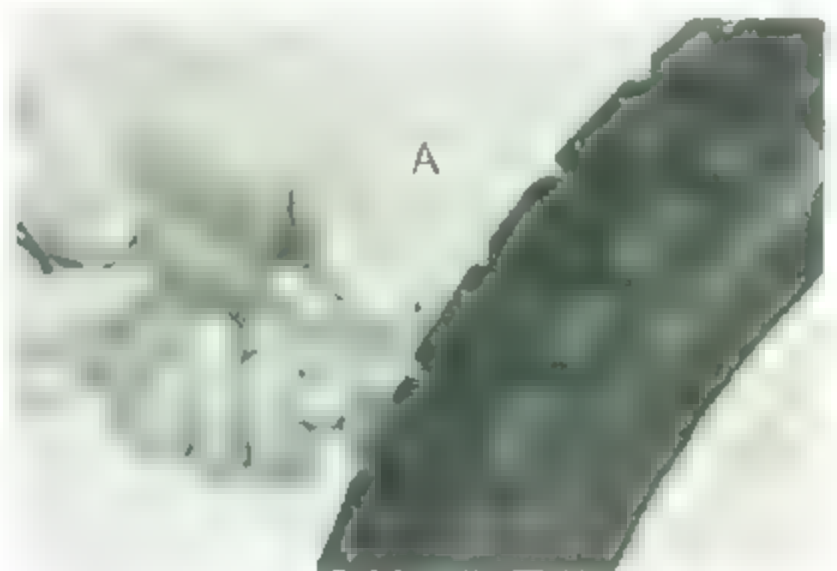


A. Air Pressure Gauge

Inspection

As the tire tread wears down, the tire becomes more susceptible to puncture and failure. An accepted estimate is that 90% of all tire failures occur during the last 10% of tread life (90% worn). So it is false economy and unsafe to use the tires until they are bald.

- Remove any imbedded stones or other foreign particles from the tread
- Visually inspect the tire for cracks and cuts, replacing the tire in case of bad damage. Swelling or high spots indicate internal damage, requiring tire replacement
- Measure the tread depth at the center of the tread with a depth gauge. Since the tire may wear unevenly, take measurements at several places
- ★ If any measurement is less than the service limit, replace the tire



A. Tire Depth Gauge

Tread Depth

Front:	
Standard:	6.4 mm
Service Limit:	2 mm
Rear:	
Standard:	8.8 mm
Service Limit:	2 mm

9-10 WHEELS / TIRES

WARNING

- To ensure safe handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure

NOTE

- Check and balance the wheel when a tire is replaced with a new one

Standard Tire

Front

Size: 90/90-21 54S
Make: DUNLOP
Type: K760, TRAIL MAX

Rear

Size: 130/80-17 65S
Make: DUNLOP
Type: K760, TRAIL MAX

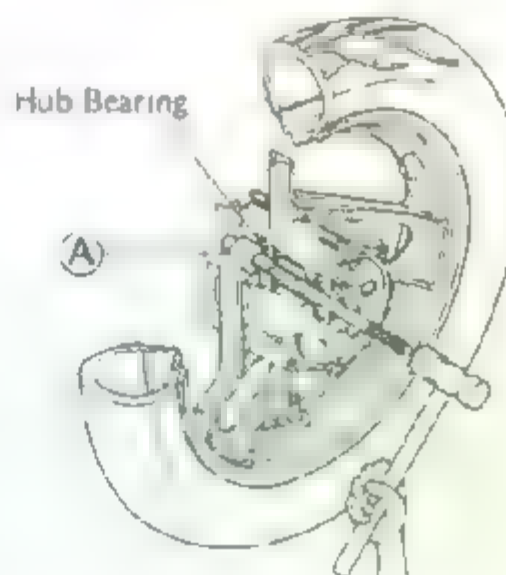
Hub Bearings

CAUTION

- Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground

Removal Note

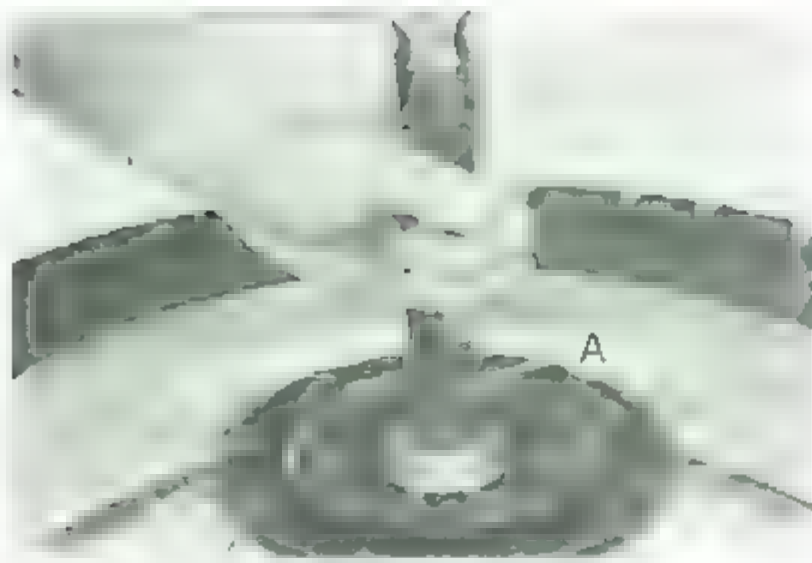
- Use the bearing remover (special tool) to remove the hub bearings.



A. Bearing Remover Set: 57001-1264

Installation Notes

- Before installing the wheel bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings
- Inspect the bearings and replace them if necessary. Lubricate them and install them using the bearing driver set (special tool) so that the marked or shielded sides face out.



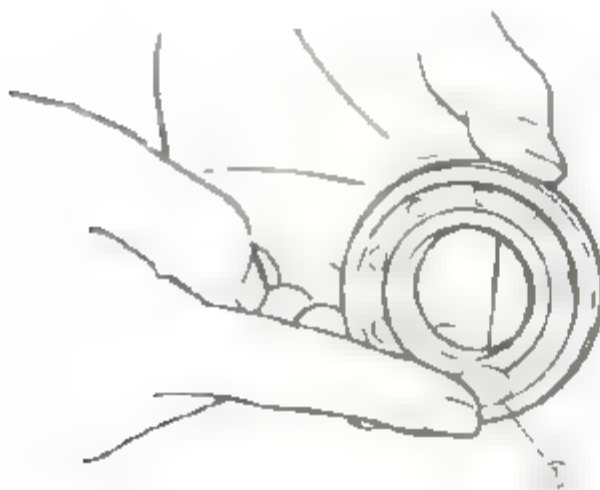
A. Bearing Driver Set 57001-1129

- Inspect the grease seal and replace if necessary. Press it in until it stops at the circlip in the hole using the same special tools used for bearing installation.

Inspection and Lubrication

Since the wheel bearings are made to extremely close tolerances, the clearance cannot normally be measured.

- Turn each bearing back and forth while checking for roughness or binding.
- ★ If roughness or binding is found, replace the bearing.
- Wash the bearing with a high flash point solvent, dry it (do not spin it while it is dry), and oil it. Spin it by hand to check its condition.
- ★ If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced.
- ★ If the bearing is to be used again, rewash it with a quality flash point solvent, dry it and pack it with good bearing grease by hand a few times to make sure the grease is distributed uniformly inside the bearing, and wipe the oil/grease out of the hub before bearing installation. Clean and grease the wheel bearings in accordance with the Periodic Maintenance Chart.



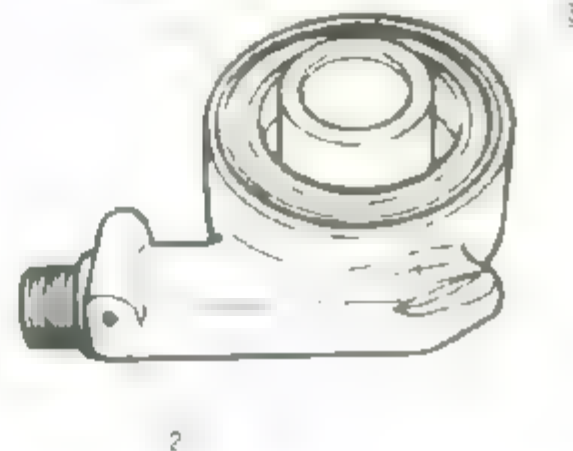
1 Grease

- Examine the bearing seal for tears or leakage.
- ★ If the seal is torn or is leaking, replace the bearing.

Speedometer Gear Housing

Disassembly

- Pull the speedometer gear housing and collar off the front wheel.
- Pull out the grease seal using a hook.



1 Speedometer Gear Housing 3 Grease Seal
2 Pin

- Pull out the speedometer gear.
- If the speedometer cable bushing or speedometer pinion needs to be removed, first drill the housing through the pin using a 1.0 to 1.5 mm drill bit. Drill the housing from the under side using a 3.0 to 3.5 mm drill bit. Using a suitable tool, tap out the pin, and then pull out the speedometer cable bushing, pin on, and wash.

NOTE

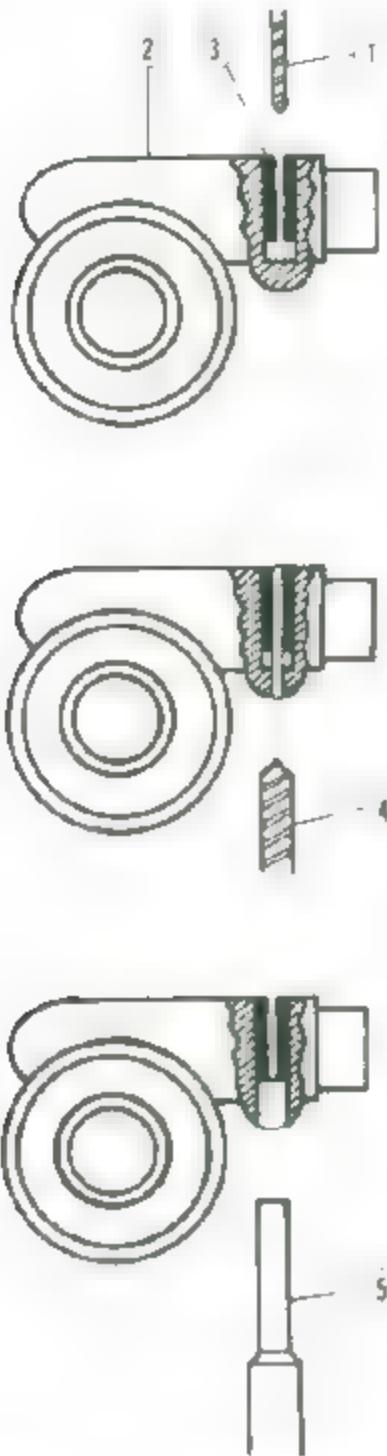
- ★ It is recommended that the assembly be replaced rather than attempting to repair the components.

Assembly Notes

- Assembly is the reverse of disassembly.
- After inserting a new pin, stake the housing hole to secure the pin in place.
- Replace the grease seal with a new one. Apply a little grease to the seal. Install it using a press or suitable driver so that the face of the seal is level with the surface of the housing.
- Regrease the speedometer gear.
- Install the speedometer gear housing so that it fits in the speedometer gear drive notches.

9-12 WHEELS / TIRES

Speedometer Gear Housing Pin Removal



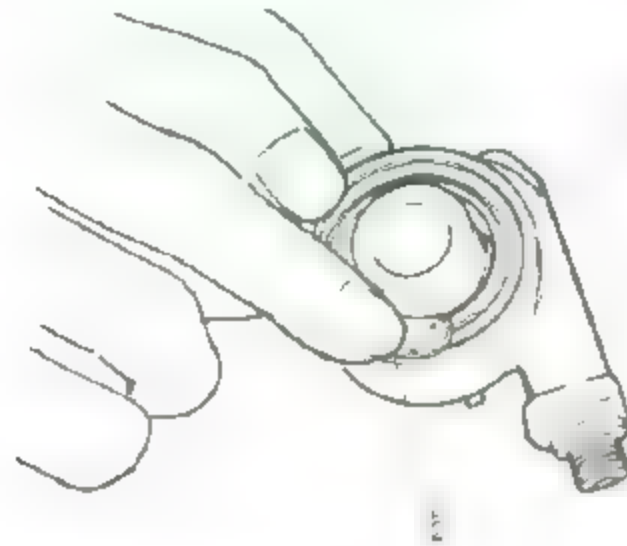
1 1 ~ 1.5 mm Bit
2. Housing
3 Pin

4 3 ~ 3.5 mm Bit
5. 3mm Rod

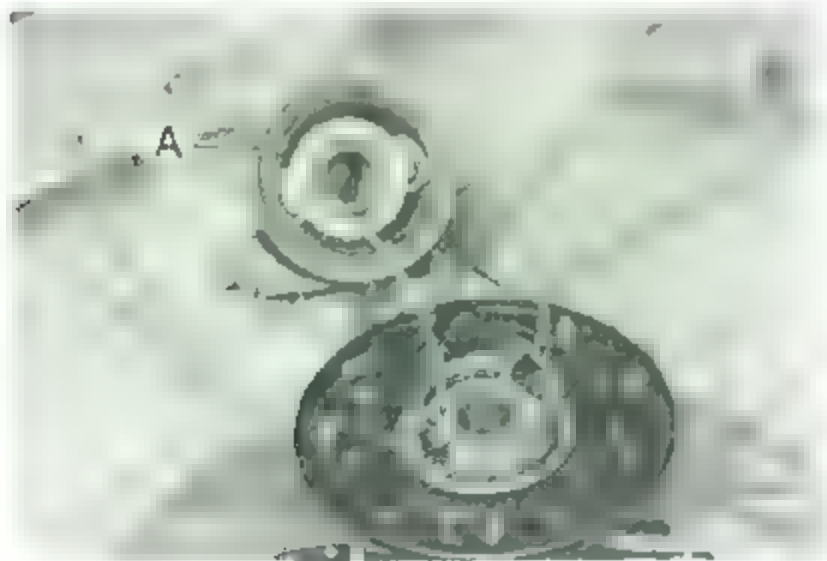
Lubrication

- Clean and grease the speedometer gear housing in accordance with the Periodic Maintenance Chart.

Speedometer Gear Housing Lubrication



1. Speedometer Gear Housing
2. Grease



A. Speedometer Gear Housing
B. Fit in the gear drive notches.

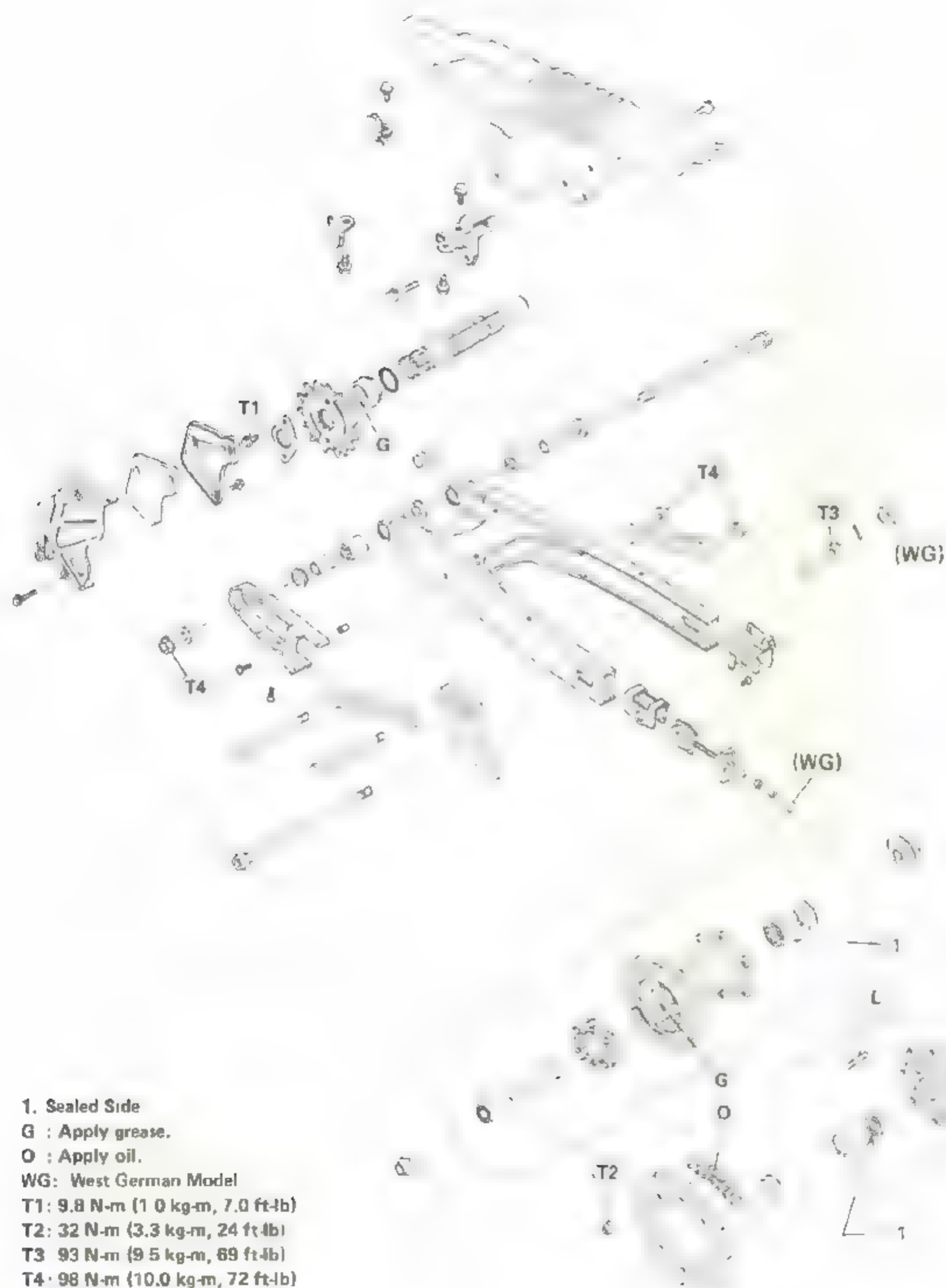
Final Drive

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10-2 FINAL DRIVE

Exploded View



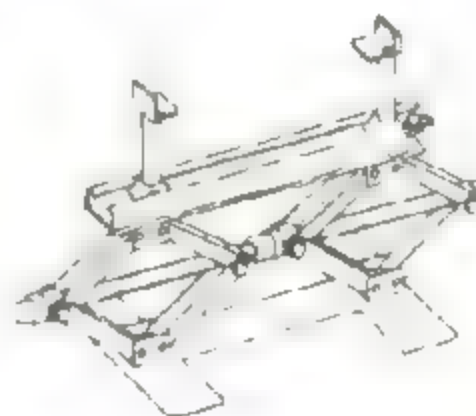
Specifications

Item	Standard	Service Limit
Drive Chain:		
Chain slack	50 ~ 55 mm	Less than 50 mm, or more than 60 mm
Chain 20 link length	317.5 ~ 318.4 mm	323 mm
Standard chain		
Make	DAIDO	---
Type	DID520V2	---
Link:		
KL650-B1	106 Link	---
KL500-B1	108 Link	---
Sprockets, Coupling:		
Engine sprocket diameter	65.58 ~ 65.78 mm/15T	64.9 mm
Rear sprocket diameter:		
KL650-B1	207.23 ~ 207.73 mm/43T	206.93 mm
KL500-B1	227.43 ~ 227.93 mm/47T	227.13 mm
Rear sprocket warp	Under 0.4 mm	0.5 mm

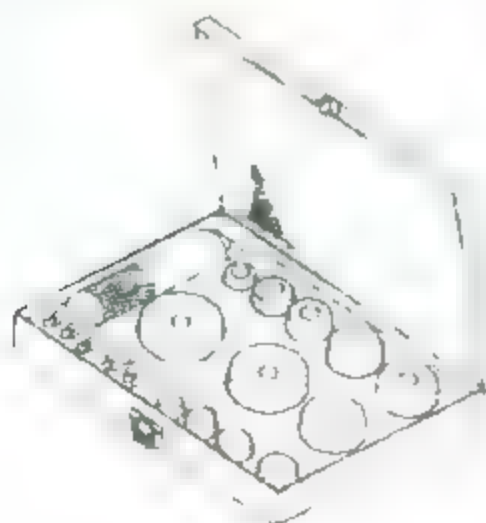
Special Tools

Jack Stand: 57001-1238

Inside Circlip Pliers: 57001-143



Bearing Driver Set: 57001-1129



10-4 FINAL DRIVE

Drive Chain

Slack Inspection

- Set the motorcycle on its side stand
- Check the wheel alignment (see Wheel Alignment Inspection), and adjust it if necessary (see Wheel Alignment Adjustment)

NOTE

○ Clean the chain if it is dirty, and lubricate it if it appears dry

- Rotate the rear wheel to find the position where the chain is tightest
- Measure the vertical movement midway between the sprockets
- ★ If the chain slack exceeds the standard, adjust it

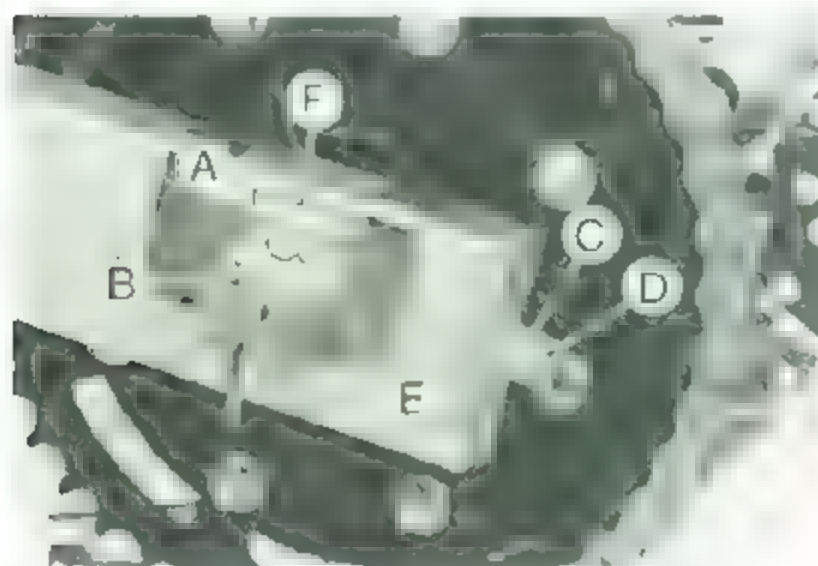


Chain Slack

Standard:	50 ~ 55 mm
Service Limit:	Less than 50mm, or more than 60mm

Slack Adjustment

- Pull out the cotter pin, and loosen the axle nut
- Loosen the left and right chain adjuster locknuts



- | | |
|------------------------|------------|
| A. Axle Nut | D. Locknut |
| B. Cotter Pin | E. Notch |
| C. Chain Adjusting Nut | F. Marks |

- If the chain is too tight, back out the left and right chain adjusting nuts evenly, and push the wheel forward until the chain is too loose

- If the chain is too loose, turn both chain adjusting nuts evenly until the drive chain has the correct amount of slack. To keep the chain and wheel properly aligned the notch on the left chain adjuster should align with the same swing arm mark as the right chain adjuster notch
- Tighten the axle nut loosely, and tighten the left and right adjusting nuts slightly. Take care not to change the adjustment during the adjusting nut tightening
- Tighten the both chain adjuster locknuts securely
- Tighten the axle nut to the specified torque (see Exploded View)
- Rotate the wheel, measure the chain slack again at the tightest position, and readjust if necessary
- Insert a new cotter pin through the axle nut and axle, and spread its ends

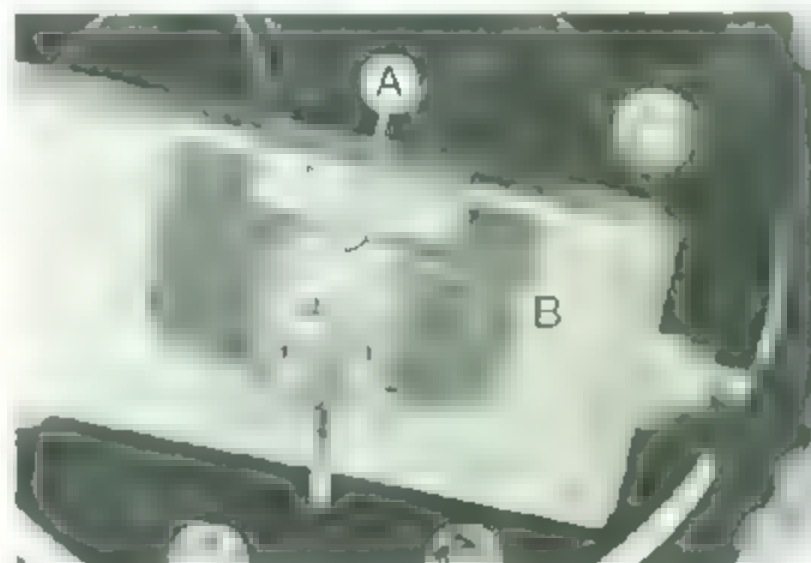
WARNING

- If the axle nut is not securely tightened and the cotter pin is not installed, an unsafe riding condition may result

- Check the rear brake effectiveness

Wheel Alignment Inspection

- Check that the notch on the left chain adjuster aligns with the same swing arm mark as the right chain adjuster



A Mark

B Notch

NOTE

- Wheel alignment can also be checked using the straightedge or string method

WARNING

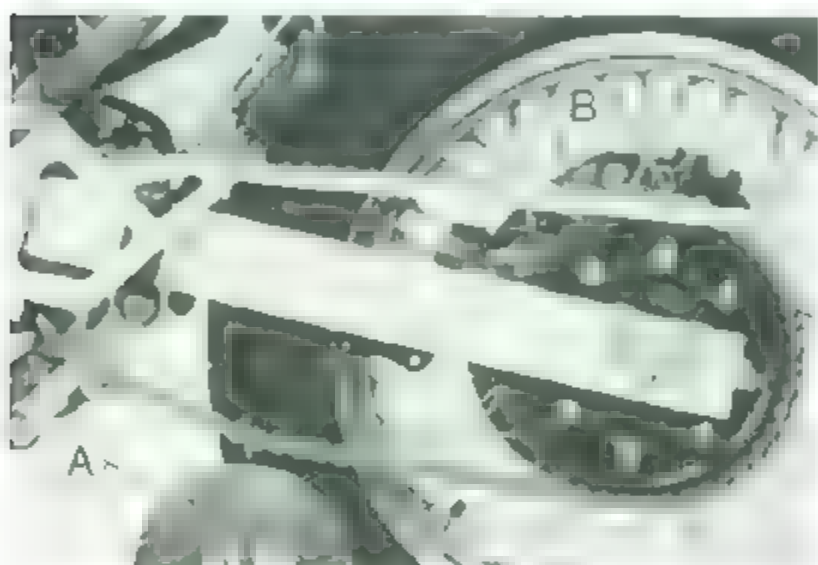
- Misalignment of the wheel will result in abnormal wear, and may result in an unsafe riding condition

Wheel Alignment Adjustment

This procedure is the same as Slack Adjustment.

Wear Inspection

- Remove the chain cover and guard
- Rotate the rear wheel to inspect the drive chain for damaged rollers, and loose pins and links
- ★ If there is any irregularity, replace the drive chain
- ★ Lubricate the drive chain if it appears dry
- Stretch the chain taut by hanging a 98N (10 kg, 20 lb) weight on the chain
- Measure the length of 20 links on the straight part of the chain from the pin center of the 1st pin to the pin center of the 21st pin. Since the chain may wear unevenly, take measurements at several places.
- ★ If any measurements exceed the service limit, replace the chain. Also, replace the front and rear sprockets when the drive chain is replaced.



A. Weight

B. Measure

Chain 20-Link Length

Standard: 317.5 ~ 318.4 mm
 Service Limit: 323 mm

WARNING

- If the drive chain wear exceeds the service limit, replace the chain or an unsafe riding condition may result. A chain that breaks or jumps off the sprockets could sag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control.
- For safety, use only the standard chain. It is an endless type and should not be cut for installation.

Standard Chain

	KL650-B1	KL500-B1
Make	DAIDO	DAIDO
Type	DiD520 V2	DiD520 V2
Link	106 Link	108 Link

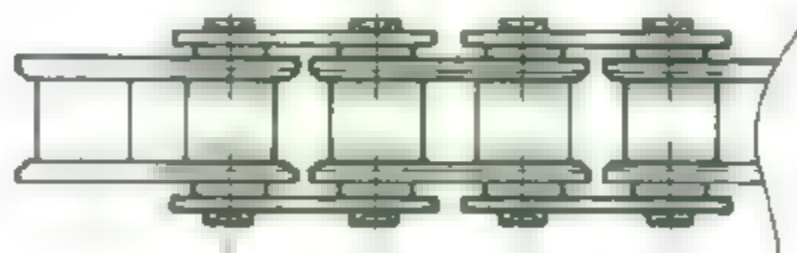
Lubrication

The chain should be lubricated with a lubricant which will both prevent the exterior from rusting and also absorb shock and reduce friction in the interior of the chain. An effective, good quality lubricant specially formulated for chains is best for regular chain lubrication. If a special lubricant is not available, a heavy oil such as SAE 90 is preferred to a lighter oil because it will stay on the chain longer and provide better lubrication.

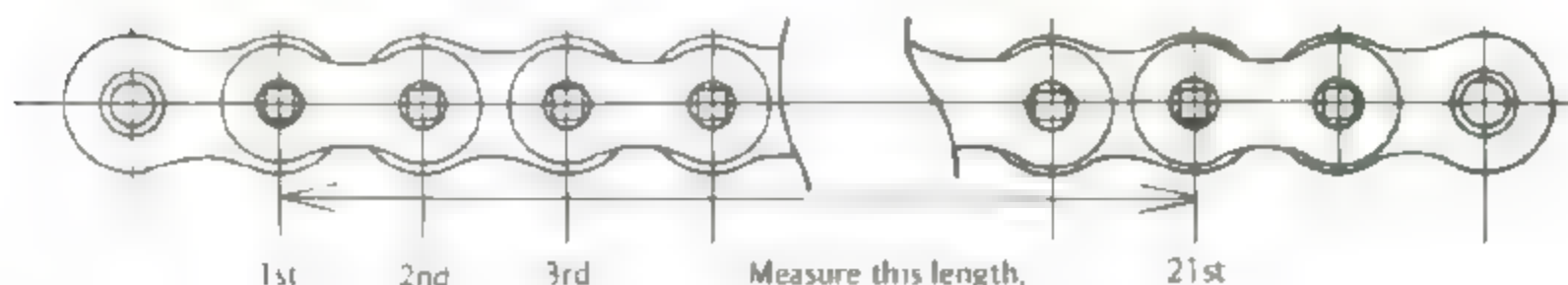
- If the chain appears especially dirty, it should be cleaned before lubrication.

CAUTION

- The O-rings between the side plates seal in the lubricant between the pin and the bushing. To avoid damaging the O-rings and resultant loss of lubricant, observe the following rules.
- Use only kerosene or diesel oil for cleaning an O-ring drive chain. Any other cleaning solution such as gasoline or trichloroethylene will cause deterioration and swelling of the O-rings.
- Immediately blow the chain dry with compressed air after cleaning.
- Complete cleaning and drying the chain within 10 minutes.
- Apply oil to the sides of the rollers so that oil will penetrate to the rollers and bushings. Apply the oil to the O-rings so that the O-rings will be coated with oil.
- Wipe off any excess oil.



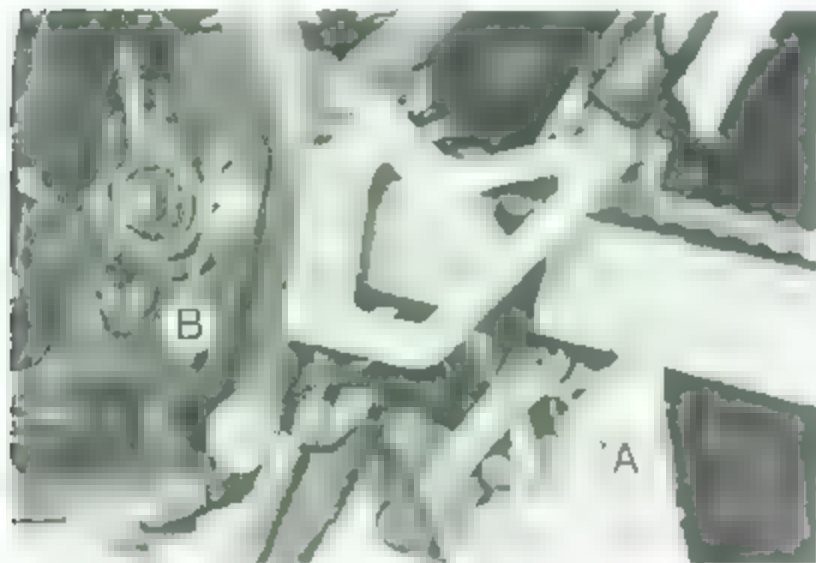
: Apply oil



10 6 FINAL DRIVE

Removal

- Remove
 - Engine Sprocket
 - Chain Cover and Guard
 - Lower Fanning
- Using the jack stand (special tool 57001-1238), raise the rear wheel off the ground
- Disengage the chain from the rear sprocket
- Remove the tie-rod upper mounting bolt
- Remove the swing arm pivot shaft, and pull back the swing arm
- Remove the chain



A. Tie-Rod Upper Mounting Bolt
B. Swing Arm Pivot Shaft

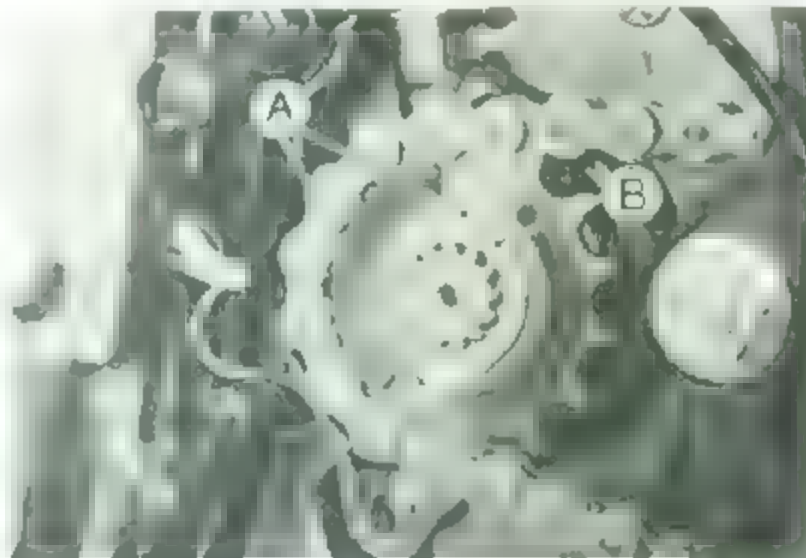
Installation Notes

- Tighten the following to the specified torque (see Exploded view).
 - Swing Arm Pivot Nut
 - Tie-Rod Upper Mounting Nut
 - Engine Sprocket Bolts
 - Rear Axle Nut
- Adjust the chain slack after installation

Sprockets, Coupling

Engine Sprocket Removal

- Remove the engine sprocket cover
- Remove the engine sprocket bolts and holding plate
- Pull off the engine sprocket from the output shaft, and disengage the sprocket from the chain
- ★ If the chain has not slack enough to pull off the sprocket, get the chain slack with the chain adjuster



A. Engine Sprocket Bolts B. Holding Plate

Engine Sprocket Installation Notes

- Tighten the engine sprocket bolts to the specified torque (see Exploded View)
- Adjust the chain slack

Rear Sprocket, Coupling Removal

- Remove the rear wheel (see rear wheel removal in Wheels/Tires chapter)

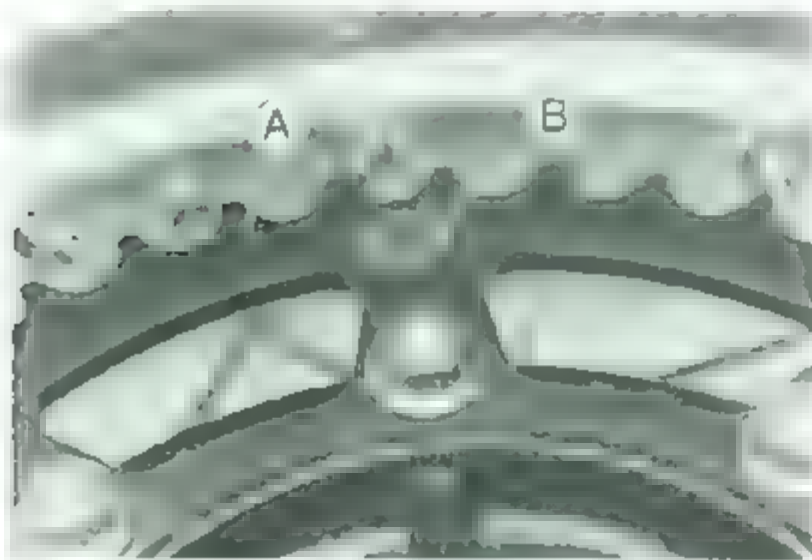
CAUTION

- Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground

- Remove the coupling from the wheel
- Pull out the coupling collar from the left, and the coupling sleeve from the right
- Install the rubber damper and wheel coupling temporarily on the rear hub to aid in rear sprocket removal
- Remove the rear sprocket nuts (8) to separate the rear sprocket from the wheel coupling.
- Remove the coupling from the rear wheel

Rear Sprocket, Coupling Installation Notes

- Install the rear sprocket so that the marked side faces out
- Tighten the rear sprocket nuts to the specified torque (see Exploded View)

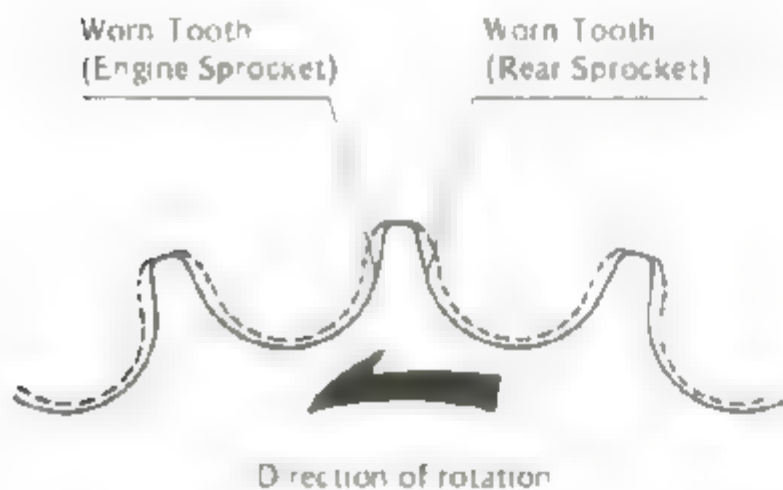


A Rear Sprocket

B Mark

Sprocket Wear Inspection

- Visually inspect the engine and rear sprocket teeth for wear and damage
- ★ If they are worn as illustrated or damaged, replace the sprocket.



- Measure the diameter of the sprocket at the base of the teeth
- ★ If the sprocket is worn down to less than the service limit, replace the sprocket

Engine Sprocket Diameter

Standard: 85.58 ~ 85.78 mm/15T
Service Limit: 64.9 mm

Rear Sprocket Diameter

KL650-B1

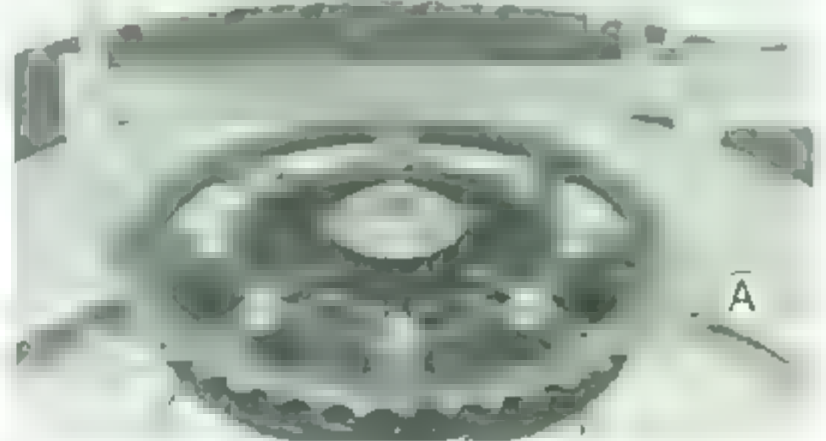
Standard: 207.23 ~ 207.73 mm/43T
Service Limit: 206.93 mm

KL500-B1

Standard: 227.43 ~ 227.93 mm/47T
Service Limit: 227.13 mm

NOTE

If a sprocket requires replacement, the chain is probably worn also. When replacing a sprocket, inspect the chain.



A Rear Sprocket

Sprocket Warp Inspection

- Remove the lower fairing
- Using the jack stand (special tool: 57001-1238), raise the rear wheel off the ground
- Set a dial gauge against the rear sprocket near the teeth as shown, and rotate the rear wheel to measure the sprocket runout (warp). The difference between the highest and lowest dial gauge readings is the amount of runout (warp)
- ★ If the runout exceeds the service limit, replace the rear sprocket



1 Dial Gauge

2. Rear Sprocket

3 Rotate

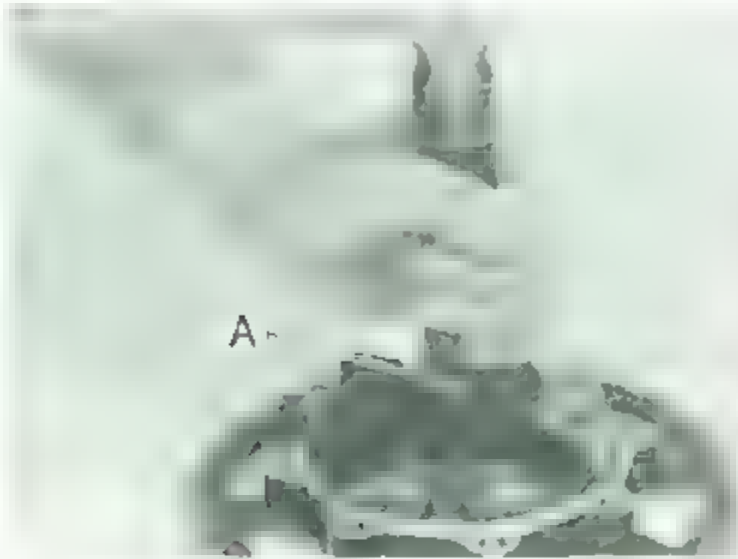
Rear Sprocket Warp

Standard: Under 0.4 mm
Service Limit: 0.5 mm

10-8 FINAL DRIVE

Coupling Bearing Removal

- Pull out the coupling collar from the left
- Remove the circlip
- Using the bearing driver set (special tools) or some other suitable tool, remove the bearing by tapping from the wheel side.



A. Bearing Driver Set: 57001-1129

Damper Inspection

- Remove the rear wheel coupling, and inspect the rubber damper
- Replace the damper if it appears damaged or deteriorated



A. Rubber Damper

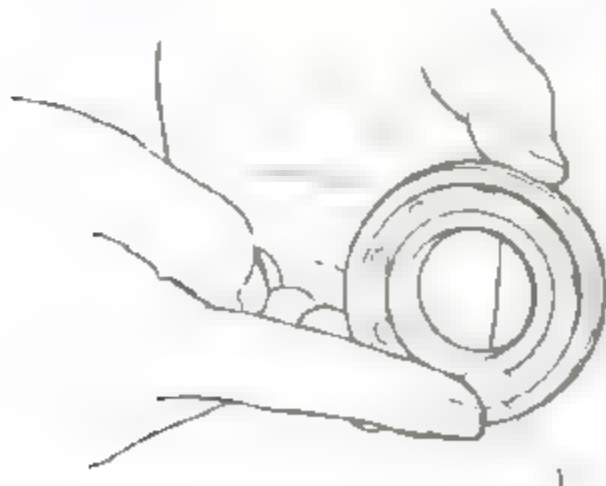
Coupling Bearing Installation Notes

- Inspect the bearing, and replace it if necessary
- Lubricate the bearing, and install it using the bearing driver set (special tool: 57001-1129)

Coupling Bearing Inspection and Lubrication

Since the coupling bearing is made to extremely close tolerances, the clearance cannot normally be measured.

- Wash the bearing with a high flash-point solvent, dry it (do not spin it while it is dry), and oil it. Spin it by hand to check its condition.
- ★ If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced.
- If the bearing is to be used again, rewash it with a high flash-point solvent, dry it, and pack it with good quality bearing grease before installation. Turn the bearing by hand a few times to make sure the grease is distributed uniformly inside the bearing, and wipe the old grease out of the coupling before bearing installation. Clean and grease the coupling bearing in accordance with the Periodic Maintenance Chart.



1 Grease

Brakes

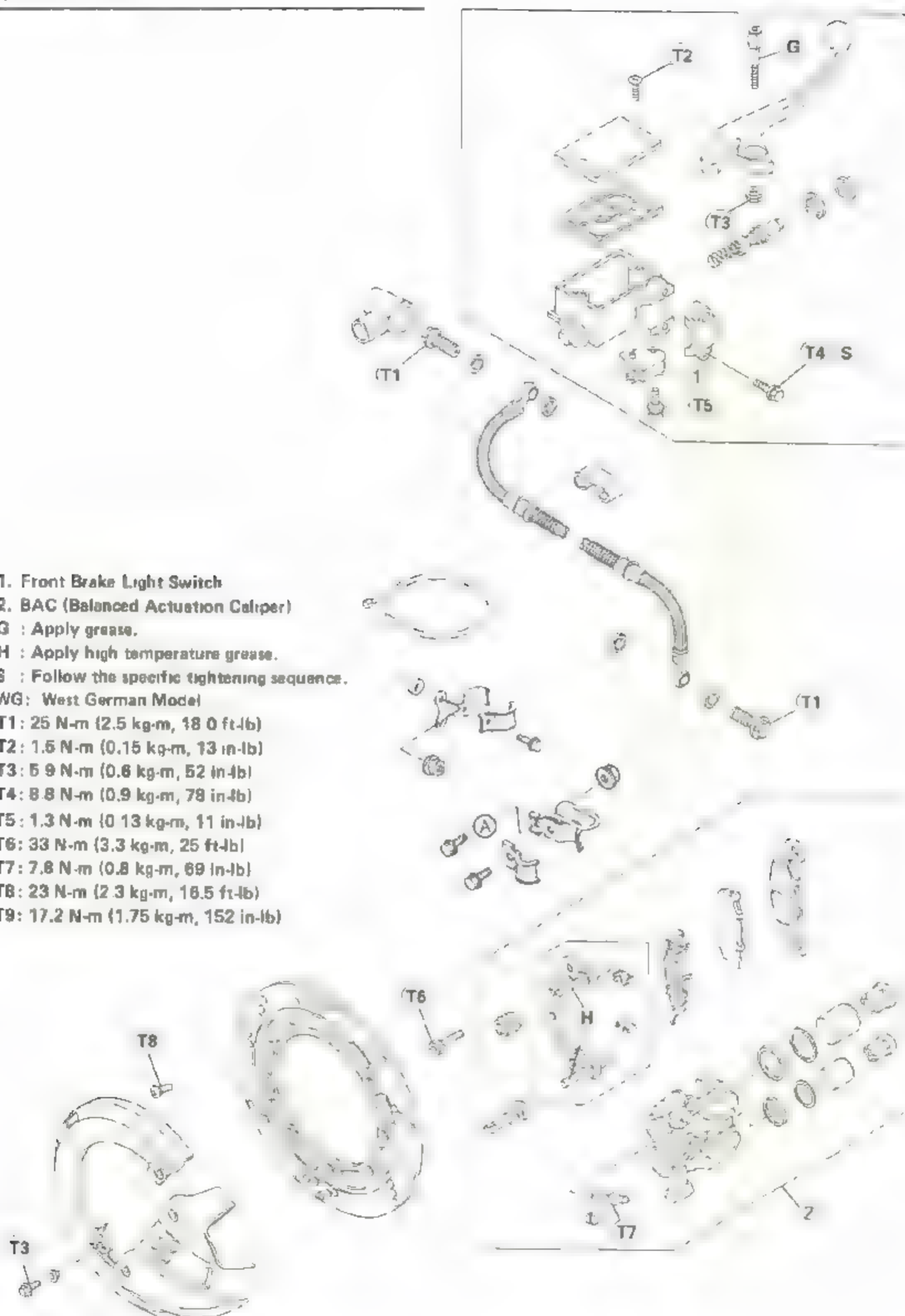
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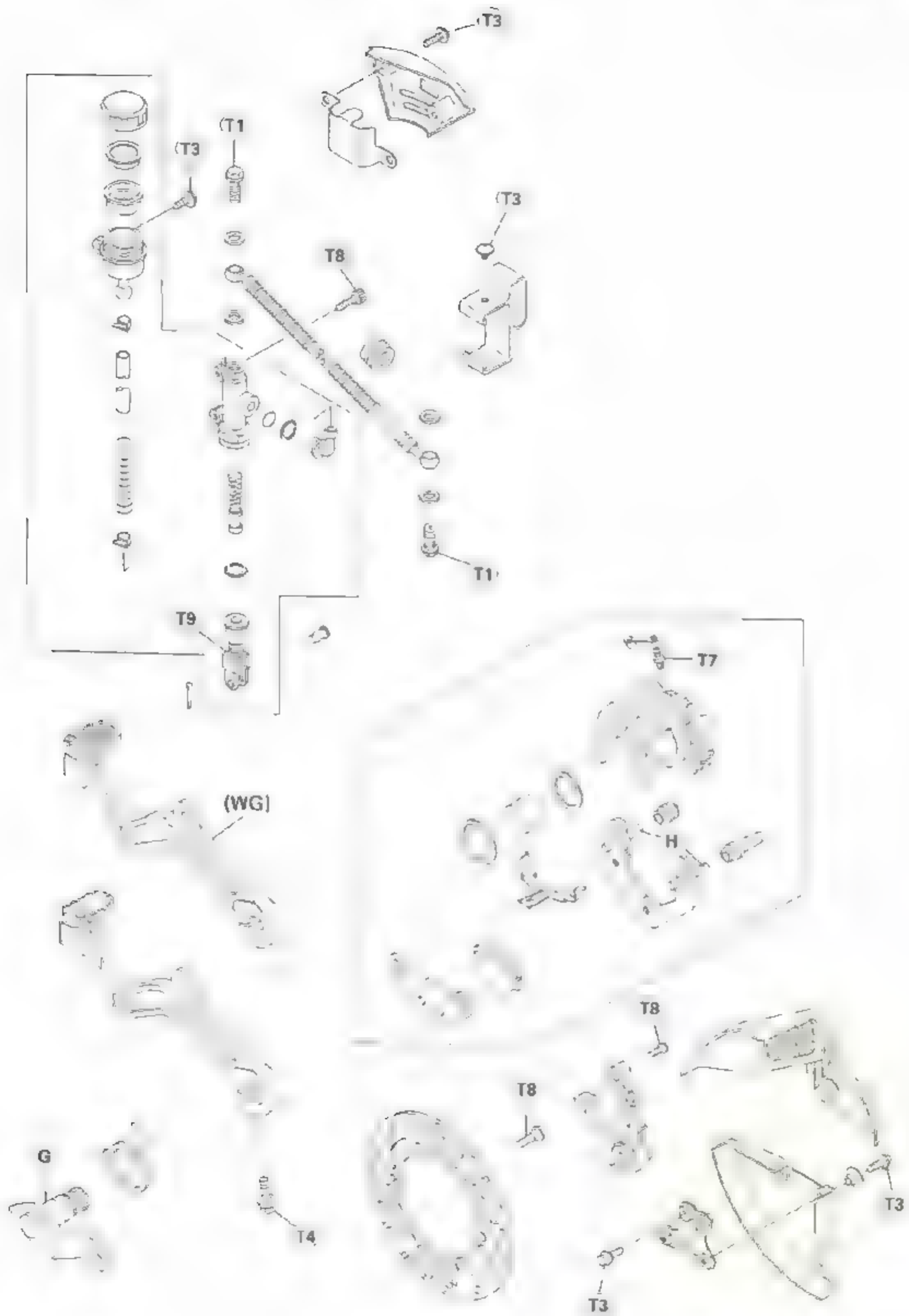
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11-2 BRAKES

Exploded View

- 1. Front Brake Light Switch**
2. BAC (Balanced Actuation Caliper)
G : Apply grease.
H : Apply high temperature grease.
S : Follow the specific tightening sequence.
WG: West German Model
T1: 25 N-m (2.5 kg-m, 18.0 ft-lb)
T2: 1.5 N-m (0.15 kg-m, 13 in-lb)
T3: 5.9 N-m (0.6 kg-m, 52 in-lb)
T4: 8.8 N-m (0.9 kg-m, 78 in-lb)
T5: 1.3 N-m (0.13 kg-m, 11 in-lb)
T6: 33 N-m (3.3 kg-m, 25 ft-lb)
T7: 7.8 N-m (0.8 kg-m, 69 in-lb)
T8: 23 N-m (2.3 kg-m, 16.5 ft-lb)
T9: 17.2 N-m (1.75 kg-m, 152 in-lb)





11-4 BRAKES

Specifications

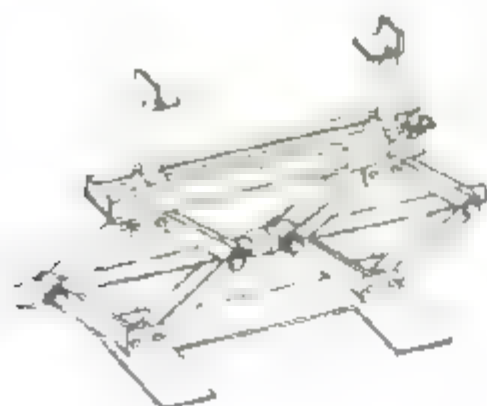
Item		Standard	Service Limit
Brake Adjustment: Brake pedal position		Level with footpeg top	
Brake Pads: Pad lining thickness:	Front	4.35	1 mm
	Rear	4.5 mm	1 mm
Brake Disc: Disc thickness		4.8 ~ 5.1 mm	4.5 mm
Disc runout		Not more than 0.2 mm	0.3 mm
Brake Fluid: Recommended disc brake fluid			
	Type	D.O.T 3	---
	Brand	Atlas Extra Heavy Duty	---
		Shell Super Heavy Duty	-
		Texaco Super Heavy Duty	-
		Wagner Lockheed Heavy Duty	-
		Castrol Girling Universal	---
		Castrol GT (LMA)	---
		Castrol Disc Brake Fluid	---

Special Tools

Inside Circlip Pliers: 57001-143



Jack Stand: 57001-1238



Brake Adjustment

Front Brake

Disc and disc pad wear is automatically compensated for and has no effect on brake lever action, so there are no parts that require adjustment on the front brake. However if the brake lever has a soft, or "spongy feeling", check the brake fluid level in the master cylinder and bleed the air from the brake line (see Bleeding the Brake Line).

NOTE

○ Check the brake fluid level in accordance with the Periodic Maintenance Chart.

Rear Brake

Disc and disc pad wear is automatically compensated for and has no effect on brake pedal action. However the brake pedal position may occasionally require adjustment due to wear of the pedal pivot, or in case of disassembly. If the brake pedal has a soft, or "spongy feeling", check the brake fluid level in the reservoir and bleed the air from the brake line (see Bleeding the Brake Line).

NOTE

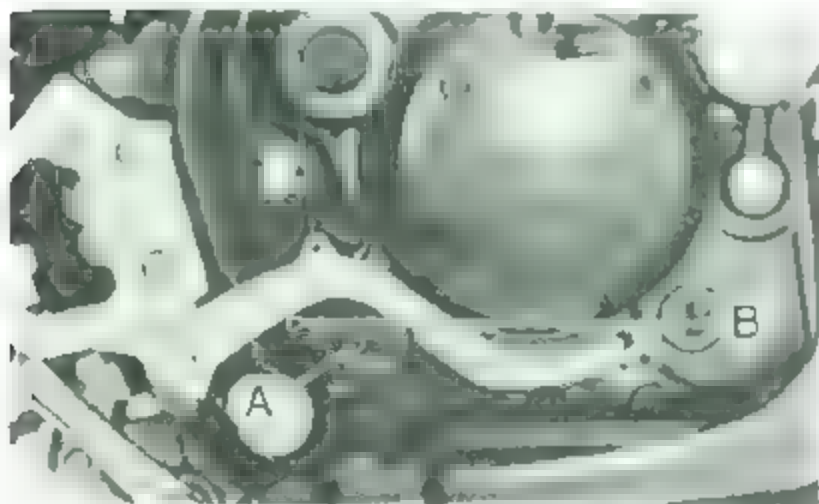
○ Check the brake fluid level in accordance with the Periodic Maintenance Chart.

Pedal Position Inspection

- When the brake pedal is released, it should return to the position specified.

Brake Pedal Position

Standard: Level with footpeg top



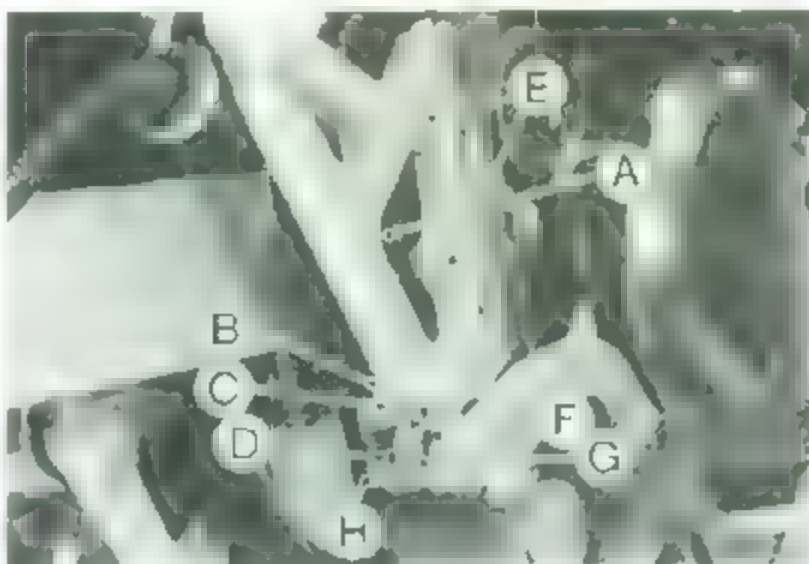
A. Footpeg

B. Brake Pedal Position

★ If it does not, adjust the brake pedal position.

Pedal Position Adjustment

- Loosen the adjuster locknut.
- Pull out the cotter pin and remove the joint pin.
- Unscrew the mounting bolts, and remove the master cylinder.
- Move the bracket up or down by turning the adjusting nut to adjust the brake pedal position.
- After adjustment, install the master cylinder on the rear footpeg bracket, and tighten the mounting bolts to the specified torque (see Exploded View).
- Install the joint pin from the outside, and insert a new cotter pin and spread its ends.
- Tighten the adjuster locknut against the adjusting nut to the specified torque (see Exploded View).



- A. Master Cylinder
- B. Locknut
- C. Adjusting Nut
- D. Brake Pedal Shaft Arm
- E. Master Cylinder Mounting Bolts
- F. Bracket
- G. Joint Pin
- H. Cotter Pin

- Recheck the brake pedal position, and readjust it if necessary.
- Adjust the brake light switch if necessary (see Brake Light Timing Inspection in the Electrical System chapter).

11-6 BRAKES

Caliper

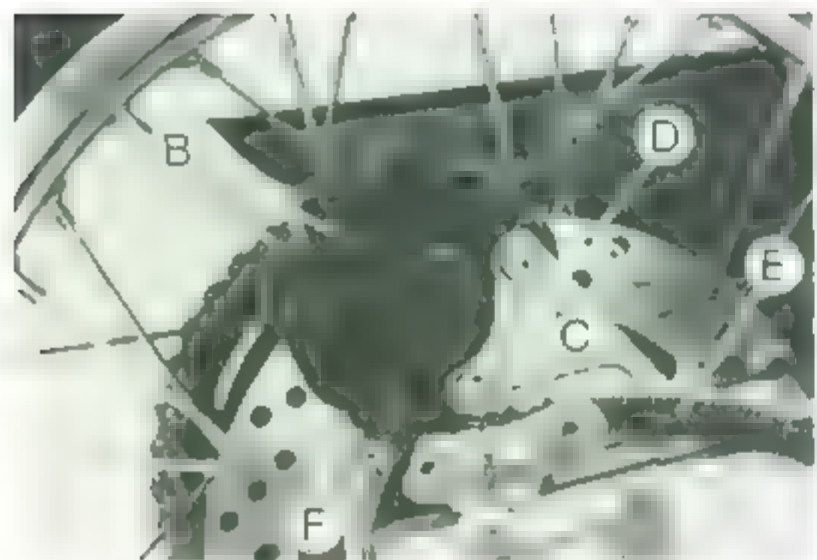
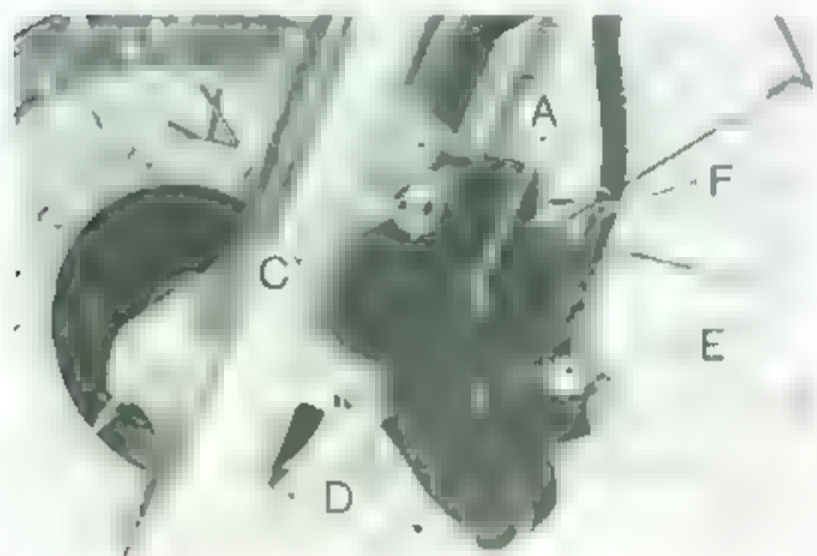
Front/Rear Caliper Removal

- Remove the disc cover
- Loosen the banjo bolt at the brake hose lower end, and tighten it loosely
- Unscrew the mounting bolts, and remove the caliper from the disc

NOTE

○ If the caliper is to be disassembled after removal and compressed air is not available, disassemble the caliper before brake hose removal (see Disassembly)

- Unscrew the banjo bolt and remove the brake hose from the caliper (see Brake Hose Removal/Installation)
- There is a flat washer on each side of the hose fitting



- | | |
|---------------------------|---------------|
| A. Front Caliper | D. Brake Disc |
| B. Rear Caliper | E. Brake Hose |
| C. Caliper Mounting Bolts | F. Banjo Bolt |

Front/Rear Caliper Installation Notes

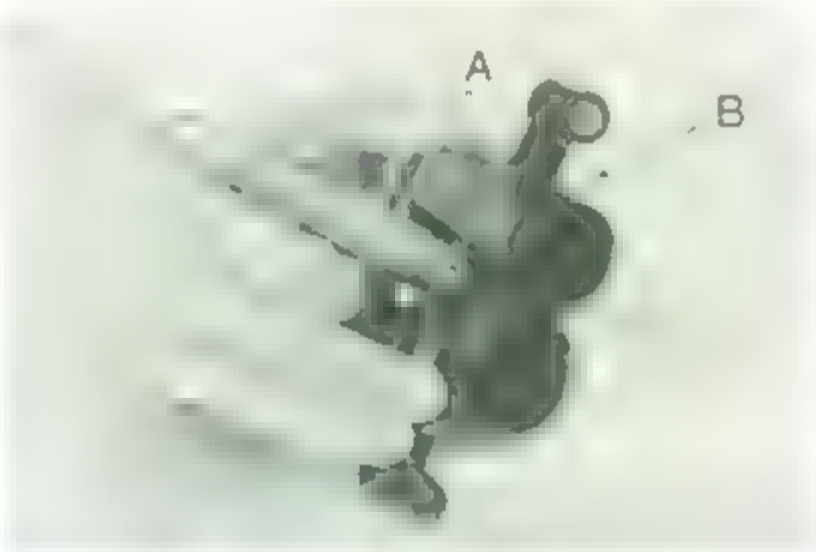
- Tighten the caliper mounting bolts to the specified torque (see Exploded View)
- Use a new flat washer on each side of the brake hose fitting, and tighten the banjo bolt to the specified torque (see Exploded View)
- Change the brake fluid (see Brake Fluid Change)
- Check the brake for wear braking power, brake drag and fluid leakage by operating the brake lever/pedal

Disassembly

- Remove the front/rear caliper
- Remove the pads and spring (see Pad Removal)
- Remove the caliper holder, shaft rubber friction boot and dust cover
- Using compressed air, remove the piston(s)
- Cover the caliper opening with a clean, heavy cloth
- Remove the piston(s) by lightly applying compressed air to where the brake line fits into the caliper

WARNING

○ To avoid serious injury, never place your fingers or palm inside the caliper opening. If you apply compressed air into the caliper, the piston(s) may crush your hand or fingers



- | | |
|-------------------------|----------|
| A. Apply compressed air | B. Cloth |
|-------------------------|----------|

NOTE

- If the caliper is to be disassembled after removal and compressed air is not available, remove the piston(s) using the following three steps before disconnecting the brake hose from the caliper
- Prepare a suitable container for brake fluid, and perform the work above it
- Remove the pads and spring (see Pad Removal)
- Pump the brake lever or pedal to remove the caliper piston(s)

CAUTION

○ Immediately wipe up any brake fluid that spills. It may painted or painted surfaces

- Remove the dust seal(s) and fluid seal(s)
- Remove the bleed valve and rubber cap.

Assembly

- Clean the caliper parts except for the pads.

CAUTION

○ For cleaning the parts, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol

- Tighten the bleed valve to the specified torque (see Exploded View)
- It is recommended that the fluid seal, which is removed, be replaced with a new one.
- Apply brake fluid to the fluid seal(s), and install it(them) into the cylinder(s) hand
- Replace the dust seal if it is damaged
- For the front caliper, do the following
- Apply brake fluid to the dust seals, and install them into the cylinders by hand.
- Apply brake fluid to the outside of the pistons, and push them into the each cylinder by hand
- Install the piston pads into the each piston
- For the rear caliper, do the following
- Apply brake fluid to the outside of the piston, and install the dust seal around the piston from the pad side of piston and slide down it
- Extend the dust seal lower end, and properly fit it into the groove in the cylinder by hand

CAUTION

○ Do not use a thin screwdriver or any other sharp instrument to fit the dust seal, or it may be damaged



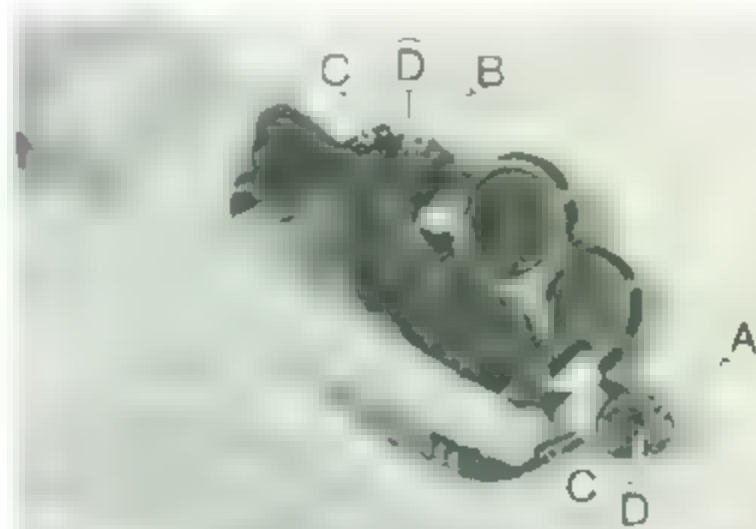
A. Dust Seal B. Groove

- Push the piston into the cylinder by hand

CAUTION

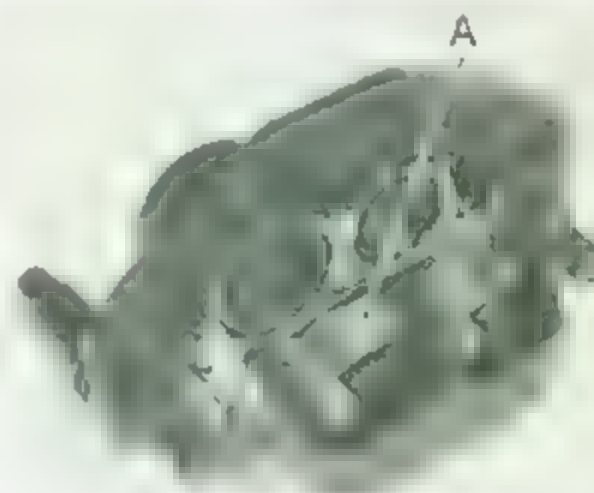
○ Do not injure the cylinder, piston and dust seal by forcing it in place

- Properly fit the dust seal upper end into the groove in the piston
- Replace the shaft rubber friction boot and dust cover if they are damaged.
- Apply a thin coat of PBC (Poly Butyl Cuprysil) grease to the caliper holder shafts and holder holes (PBC is a special high temperature, water-resistant grease)



A. Shaft Rubber Friction Boot
B. Dust Cover
C. Caliper Holder Shafts
D. Holder Holes

- Install the anti-rattle spring in the caliper as shown



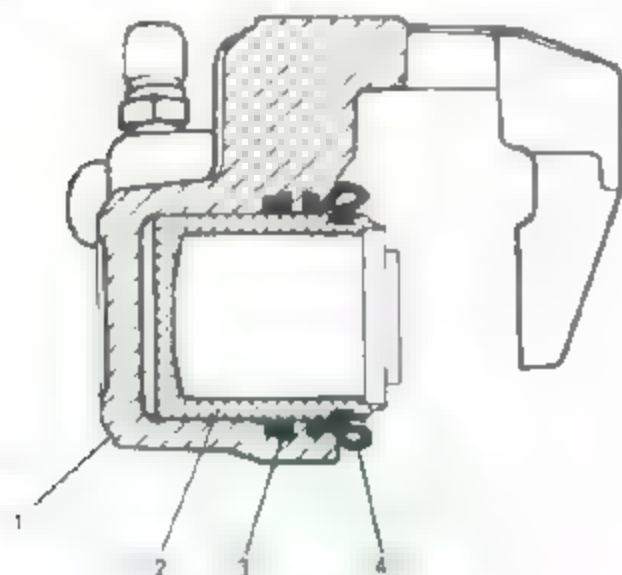
A. Anti-Rattle Spring

- Install the pads (see Pad Installation).

11-8 BRAKES

Fluid Seal Damage

The fluid seal around the piston maintains the proper pad/disc clearance. If this seal is not in good condition pad wear will increase, and constant pad drag on the disc will raise brake and brake fluid temperature.



- 1. Caliper
- 2. Piston
- 3. Fluid Seal
- 4. Dust Seal

Replace the fluid seal under any of the following conditions: (a) fluid leakage around the pad; (b) brakes overheat; (c) there is a large difference in left and right pad wear; (d) the seal is stuck to the piston. If the fluid seal is replaced, replace the dust seal as well. Also, replace all seals every other time the pads are changed.

Dust Seal, Cover and Shaft Rubber Friction Boot Damage

- Check that the dust seal, cover and shaft rubber friction boot are not cracked, worn, swollen, or otherwise damaged.
- ★ If they show any damage, replace them.

Piston Cylinder Damage

- Visually inspect the piston and cylinder surfaces.
- ★ Replace the cylinder and piston if they are badly scored or rusty.

Holder Shaft Wear

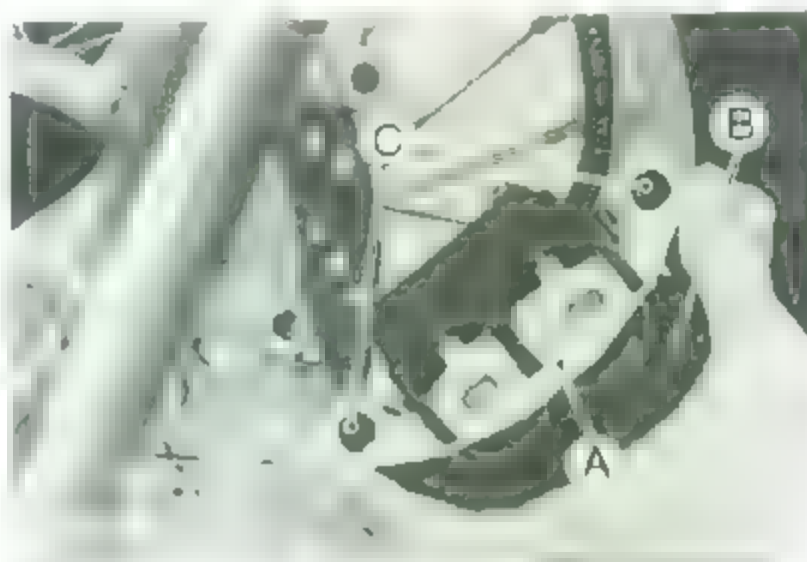
The caliper body must slide smoothly on the caliper holder shafts. If the body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.

- Check to see if the caliper holder shafts are not badly worn or stepped, or rubber friction boot are not damaged.
- ★ If the rubber friction boot are damaged, replace the rubber friction boot, and the caliper holder.

Brake Pads

Removal

- Remove the disc cover.
- Remove the caliper from the disc, and take out the piston side pad from the caliper holder.
- Push the caliper holder toward the piston and then remove the pad from the caliper holder shafts.



- A. Pad
- B. Caliper Holder
- C. Holder Shafts

Installation

- Push the caliper piston in by hand as far as it will go.
- Install the anti-rattle spring.
- Install the piston side pad first and then install the remaining pad.

WARNING

- Do not attempt to drive the motorcycle until a full brake lever or pedal is obtained by pumping the brake lever or pedal until the pads are against the disc. The brake will not function on the first application of the lever or pedal if this is not done.

Inspection

- Check the lining thickness and condition of the pads in each caliper.
- ★ If either pad is damaged, replace both pads in the caliper as a set.
- ★ If the lining thickness of either pad is less than the service limit, replace both pads in the caliper as a set.

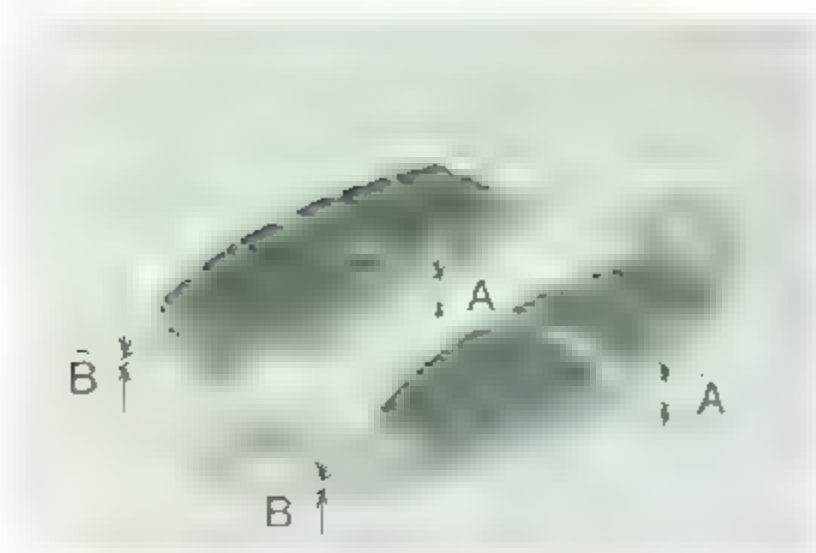
Pad Lining Thickness

Front

Standard:	4.35mm
Service Limit:	1mm

Rear

Standard	4.5mm
Service Limit:	1mm



A. Lining Thickness

B. Service Limit

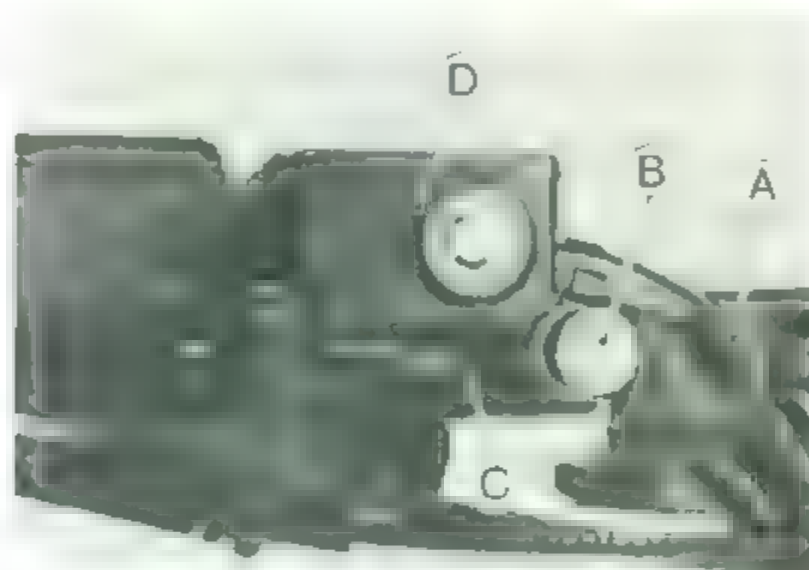
Master Cylinder

CAUTION

- Brake fluid quickly ruins painted or plated surfaces; any spilled fluid should be completely wiped up immediately.

Front Master Cylinder Removal

- Remove the right handguard.
- Pull back the dust cover, and remove the banjo bolt to disconnect the upper brake hose from the master cylinder (see Brake Hose Removal/Installation). There is a flat washer on each side of the hose fitting.



A. Dust Cover

B. Banjo Bolt

C. Master Cylinder

D. Reservoir

- Disconnect the front brake switch connectors.
- Unscrew the clamp bolts, and take off the master cylinder as an assembly with the reservoir, brake lever, and brake switch attached.



A. Brake Switch

B. Connectors

C. Clamp Bolts

11-10 BRAKES

Front Master Cylinder Installation Notes

- The master cylinder clamp must be installed with the arrow mark pointing upward
- Tighten the upper clamp bolt first to the specified torque (see Exploded View), and then tighten the lower clamp bolt to the same torque. There will be a gap at the lower part of the clamp after tightening



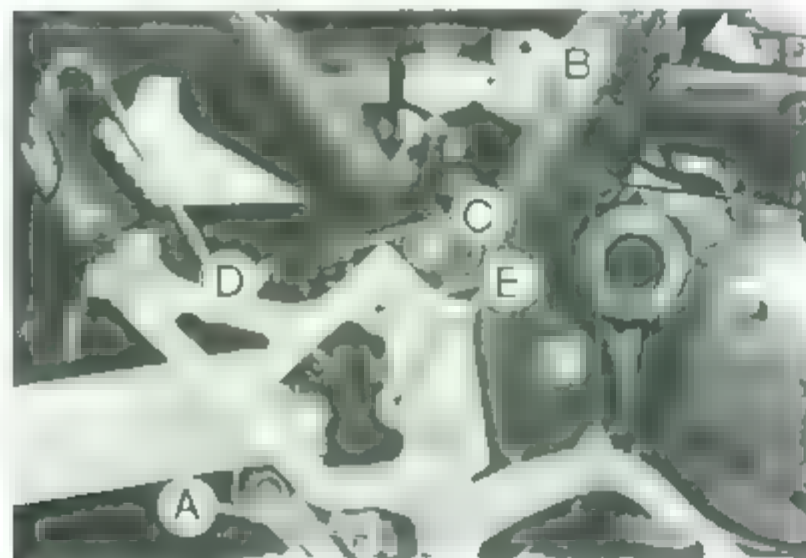
A. Arrow Mark

B. Clamp Bolt (Tighten upper clamp bolt first)

- Use a new flat washer on each side of the brake hose fitting, and tighten the banjo bolt to the specified torque (see Exploded View)
- Change the brake fluid after master cylinder installation (see Brake Fluid Change)
- Check the brake for weak braking power, brake drag, and fluid leakage

Rear Master Cylinder Removal

- Remove the reservoir cover



A. Joint Pin

D. Master Cylinder

B. Reservoir Mounting Bolt

E. Mounting Bolts

C. Banjo Bolt

- Remove the reservoir mounting bolt.
- Pull out the cotter pin, and remove the joint pin.
- Unscrew the banjo bolt to disconnect the brake hose from the master cylinder (see Brake Hose Removal/ Installation). There is a flat washer on each side of the hose fitting

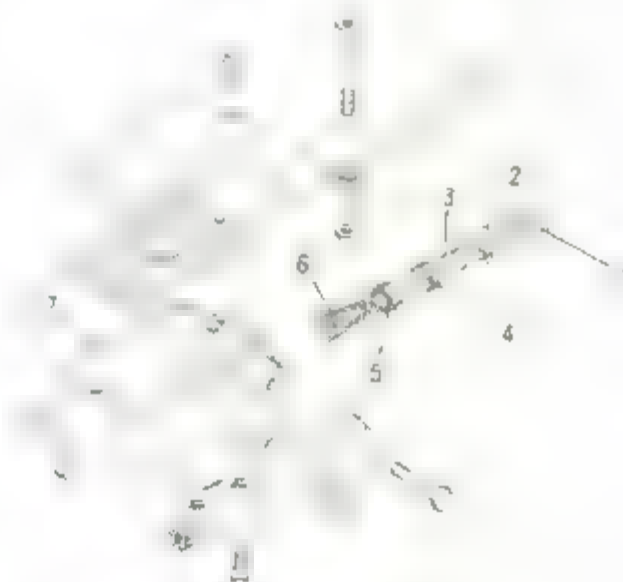
- Unscrew the master cylinder mounting bolts, and remove the master cylinder with the reservoir
- Unscrew the reservoir cap and pour the brake fluid into a container
- Remove the reservoir and its hose from the master cylinder

Rear Master Cylinder Installation Notes

- Tighten the master cylinder mounting bolts to the specified torque (see Exploded View)
- Use a new flat washer on each side of the brake hose fitting, and tighten the banjo bolts to the specified torque (see Exploded View)
- Tighten the reservoir mounting bolt to the specified torque (see Exploded View)
- Change the brake fluid after master cylinder installation (see Brake Fluid Change)
- Check the brake for weak braking power, brake drag, and fluid leakage
- Check the brake pedal position, and the rear brake light switch operation (see Brake Pedal Position Inspection, and Brake Light Timing Inspection in the Electrical System chapter)

Front Master Cylinder Disassembly

- Remove the front master cylinder (see Front Master Cylinder Removal)



1. Dust Cover

2. Circlip

3. Piston

4. Secondary Cup

5. Primary Cup

6. Return Spring

7. Reservoir

- Remove the reservoir cap and diaphragm, and pour the brake fluid into a container
- Unscrew the locknut and pivot bolt, and remove the brake lever
- Push the dust cover out of place, and using the inside circlip pliers (special tool: 57001 143), remove the circlip
- Pull out the piston, secondary cup, primary cup, and return spring

CAUTION

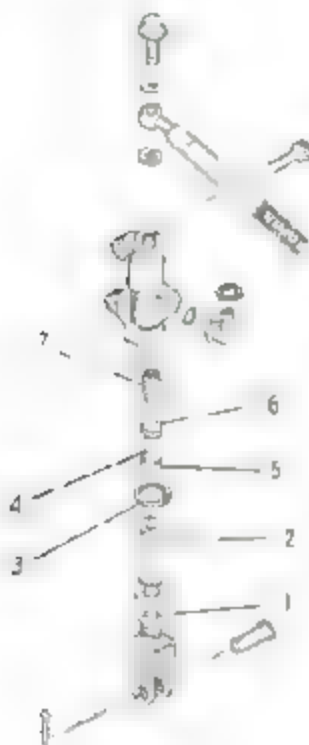
- Do not remove the secondary cup from the piston since removal will damage it.

Rear Master Cylinder Disassembly

- Remove the rear master cylinder (see Rear Master Cylinder Removal)
- Slide the dust cover on the push rod out of place, and using the inside circlip pliers (special tool: 57001-143), remove the circlip
- Pull out the push rod with the piston stop
- Take off the piston, secondary cup, primary cup, and return spring

CAUTION

- Do not remove the secondary cup from the piston since removal will damage it.



- | | |
|---------------|------------------|
| 1. Push Rod | 5. Secondary Cup |
| 2. Dust Cover | 6. Primary Cup |
| 3. Circlip | 7. Return Spring |
| 4. Piston | |

Assembly Notes

- Clean all parts with brake fluid or alcohol, and apply brake fluid to the inner surface of the cylinder before assembly

CAUTION

- Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol, for cleaning brake pads. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash

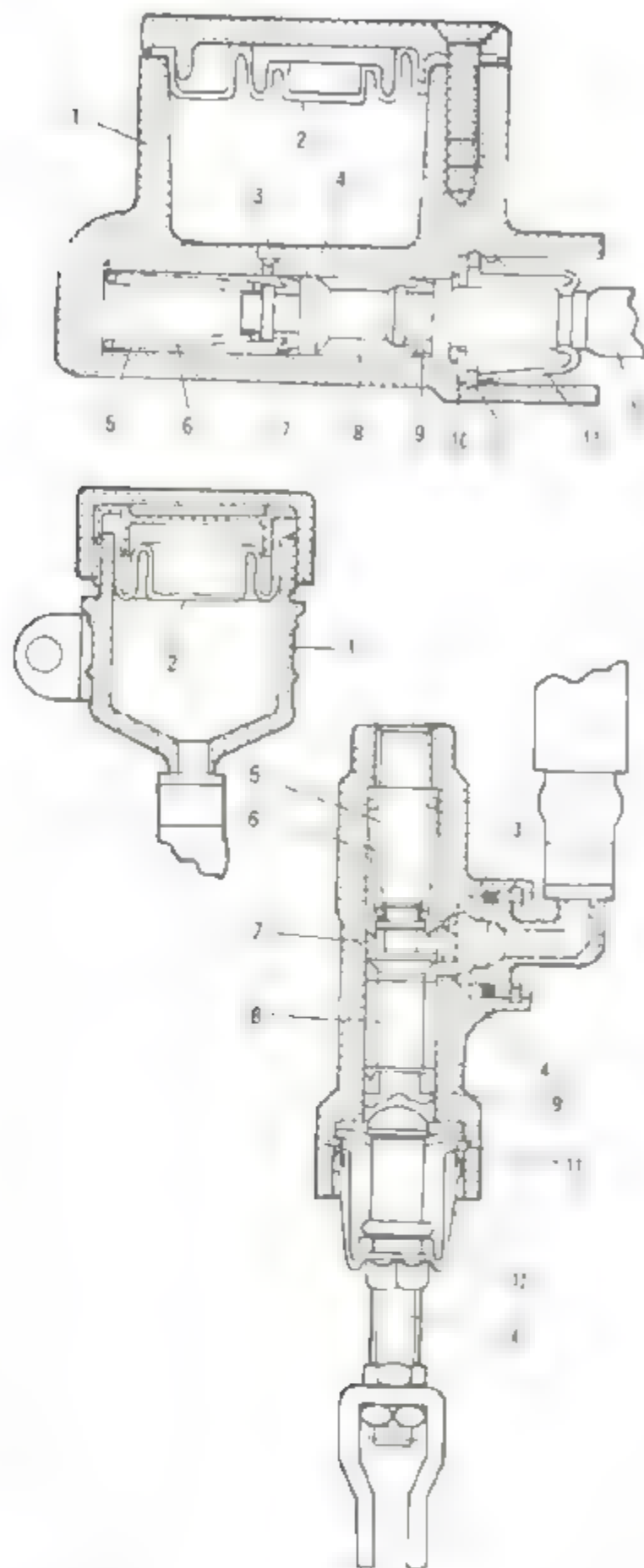
off completely, and will eventually deteriorate the rubber used in the disc brake

- Take care not to damage the inner surface of the cylinder, or the piston
- Tighten the brake lever pivot bolt locknut to the specified torque (see Exploded View).

Inspection (Visual Inspection)

- Disassemble the front and rear master cylinders
- Check that there are no scratches, rust or pitting on the inside of each master cylinder and on the outside of each piston.
- ★ If a master cylinder or piston shows any damage, replace them.
- Inspect the primary cups and secondary cups
- ★ If a cup is worn, damaged, softened (rotted) or swollen the piston assembly should be replaced to renew the cups.
- ★ If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cup
- Check the dust covers for damage
- ★ If they are damaged, replace them.
- Check that the relief and supply ports are not plugged
- ★ If the small relief port becomes plugged the brake pads will drag on the disc. Blow the ports clean with compressed air
- Check the piston return springs for any damage
- ★ If a spring is damaged replace it.

11-12 BRAKES

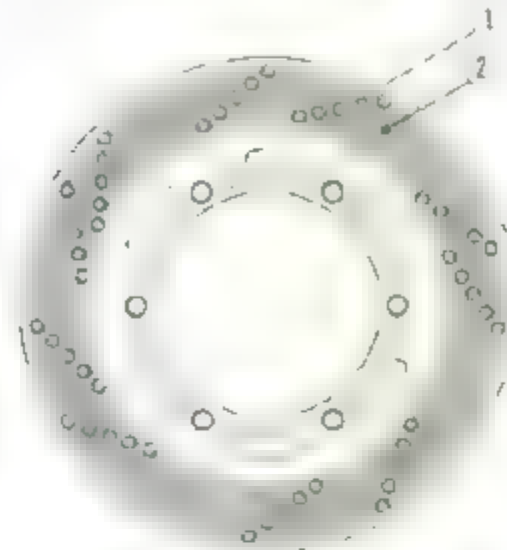


- | | |
|------------------|------------------|
| 1. Reservoir | 8. Piston |
| 2. Diaphragm | 9. Secondary Cup |
| 3. Relief Port | 10. Washer |
| 4. Supply Port | 11. Circlip |
| 5. Cylinder | 12. Dust Cover |
| 6. Return Spring | 13. Brake Lever |
| 7. Primary Cup | 14. Push Rod |

Brake Disc

Inspection

- Visually inspect the disc.
- ★ If disc is scratched or damaged replace the disc.
- Measure the thickness of each disc at the point where it has worn the most.
- ★ Replace the disc if it has worn past the service limit.



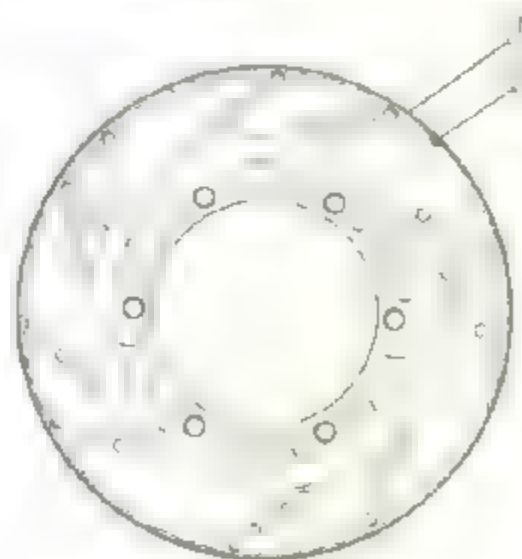
1. Disc

2. Measuring Area

Disc Thickness

Standard:	4.8 ~ 5.1 mm
Service Limit:	4.5 mm

- Remove the lower fanning
- Using the jack stand (special tool 57001-1238), raise the front/rear wheel off the ground.
- Set up a dial gauge against the disc.
- For the front disc, turn the hand-bar fully to one side
- Rotate the wheel to measure disc runout. The difference between the highest and lowest dial readings is the amount of runout.
- ★ If disc runout exceeds the service limit, replace the disc.



1. Disc

2. Measuring Area

Disc Runout

Standard:	Not more than 0.2 mm
Service Limit:	0.3 mm

Brake Fluid

Level Inspection

In accordance with the Periodic Maintenance Chart, inspect the brake fluid level in the front and rear brake fluid reservoirs.

- Check the brake fluid level in the reservoir.

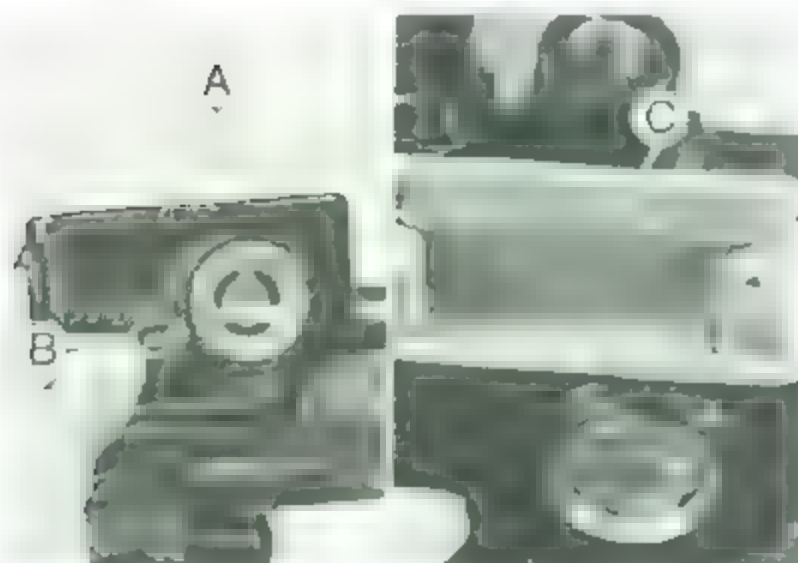
NOTE

- Hold the reservoir horizontal when checking brake fluid level.

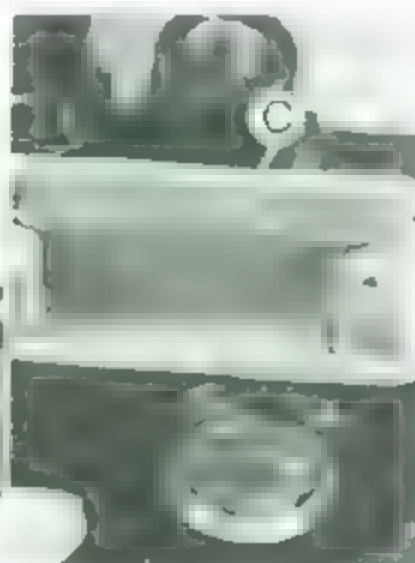
- ★ The fluid level must be kept above the lower level lines. If the fluid level is lower than the lower level line, fill the reservoir to the upper level line of the reservoir.

WARNING

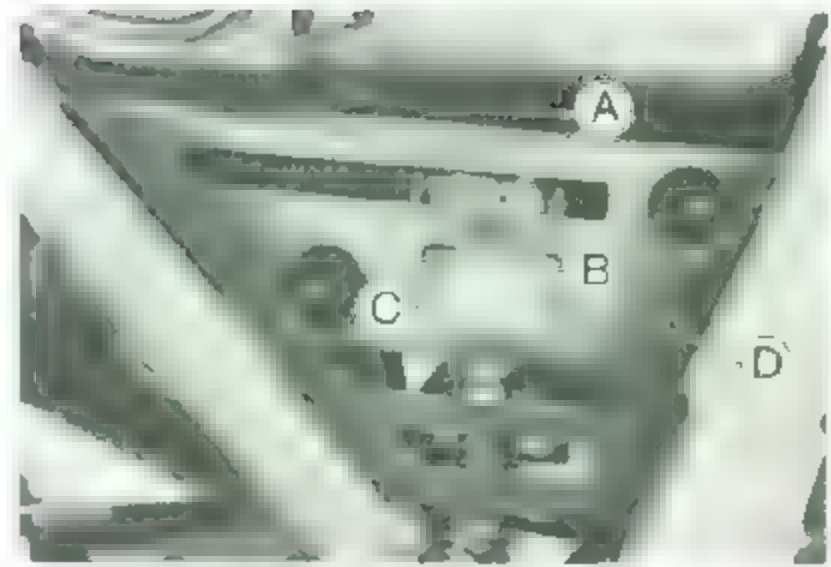
- Change the brake fluid in the brake system completely if the brake fluid must be refilled but the type and brand of the brake fluid that already is in the reservoir are unidentified. After changing the fluid, use only the same type and brand of fluid thereafter. Mixing different types and brands of brake fluid lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.



A Reservoir (front)
B Lower Level Line



C. Upper Level Line



A Reservoir (Rear)
B Upper Level Line
C Lower Level Line
D Reservoir Cover

Change

In accordance with the Periodic Maintenance Chart, change the brake fluid. The brake fluid should also be changed if it becomes contaminated with dirt or water. Further more, the brake fluid should be changed whenever the brake line parts are removed to bleed the air fast and completely.

Brake Fluid Requirement:

Recommended fluids are given in table below. If none of the recommended brake fluids are available, use extra heavy duty brake fluid only from a container marked DOT 3.

Recommended Disc Brake Fluid

Type:	D.O.T.3
Brand:	Atlas Extra Heavy Duty
	Shell Super Heavy Duty
	Texaco Super Heavy Duty
	Wagner Lockheed Heavy Duty
	Castrol Girling-Universal
	Castrol GT(LMA)
	Castrol Disc Brake Fluid

Changing Brake Fluid

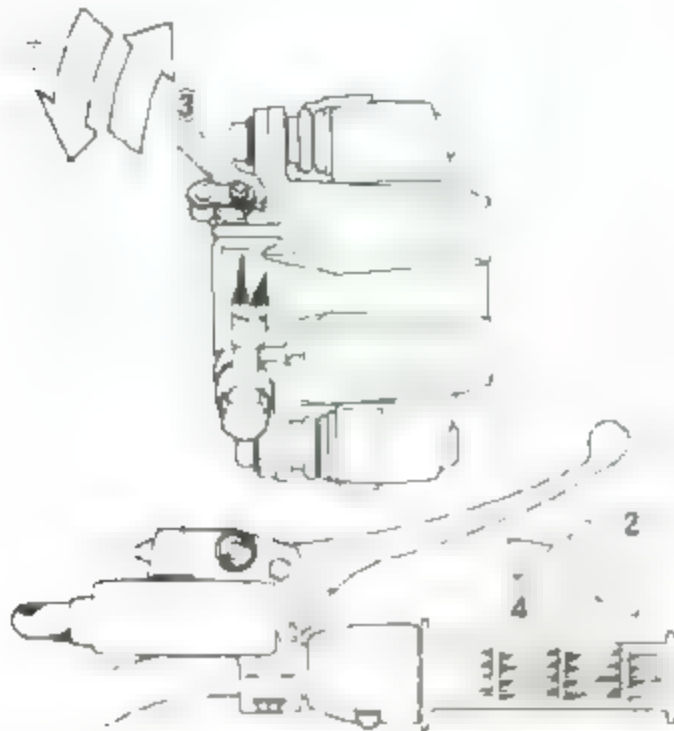
NOTE

- The procedure to change the front brake fluid is as follows. Changing the rear brake fluid is the same as for the front brake.

- Level the brake fluid reservoir.
- Removal the reservoir cap.
- Remove the rubber cap on the bleed valve.
- Attach a clear plastic hose to the bleed valve on the caliper, and run the other end of the hose into a container.

11-14 BRAKES

- Change the brake fluid as follows.



1. Open the bleed valve.
2. Apply the brake and hold it.
3. Close the bleed valve.
4. Release the brake.

- Repeat this operation until fresh brake fluid comes out from the plastic hose or the color of the fluid changes.

NOTE

- The fluid level must be checked often during the changing operation and replenished with fresh brake fluid. If the fluid in the reservoir runs out any time during the changing operation, the brakes will need to be bled since air will have entered the brake line.

- Remove the plastic hose from the bleed valve.
- Tighten the bleed valve to the specified torque (see Exploded View), and install the rubber cap.
- After changing the fluid, check the brakes for weak braking power, brake drag, and fluid leakage.
- ★ If necessary, bleed the air from the line.

Bleeding the Brake Line

The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake line, brake lever movement will be partially used in compressing the air. This will make the lever feel spongy, and there will be a loss in braking power.

Bleed the air from the brake whenever brake lever action feels soft or spongy, after the brake fluid is changed, or whenever a brake line fitting has been loosened for any reason.

NOTE

- The procedure to bleed the front brake line is as follows. Bleeding the rear brake line is the same as for the front brake.

- Remove the reservoir cap and fill the reservoir to the upper level line of the reservoir.

NOTE

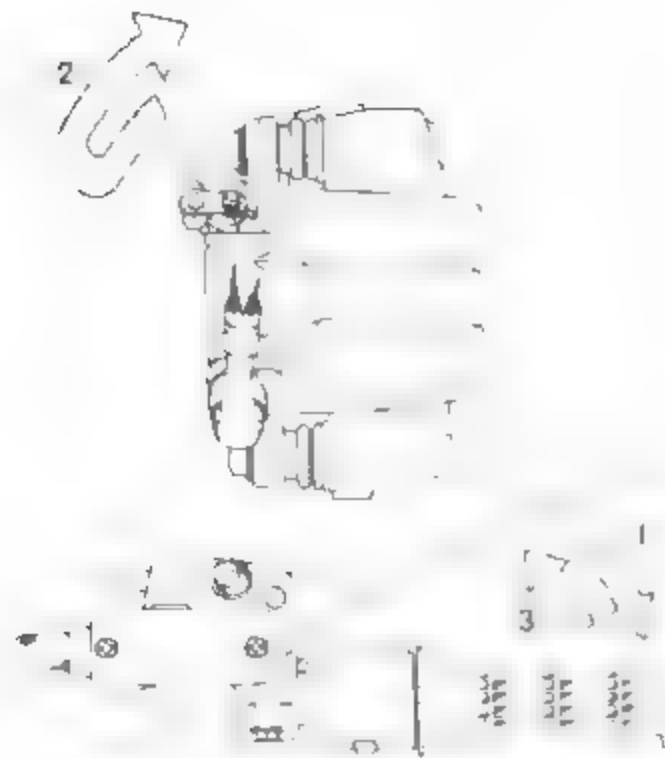
- The fluid level must be checked often during the bleeding operation and replenished with fresh brake fluid as necessary. If the fluid in the reservoir runs almost out any time during bleeding operation, the bleeding operation must be done over again from the beginning since air will have entered the line.

- With the reservoir cap off, slowly pump the brake lever several times until no air bubbles can be seen rising up through the fluid from the hoses at the bottom of the reservoir. Bleed the air completely from the master cylinder by this operation.

NOTE

- Tap the brake hose lightly from the caliper to the reservoir for easier bleeding.

- Install the reservoir cap.
- Attach a clear plastic hose to the bleed valve on the caliper, and run the other end of the hose into a container.
- Pump the brake lever until it becomes hard and then, holding the brake applied, quickly open (turn counter-clockwise) and close the bleed valve.
- Release the brake.
- Repeat this operation until no more air can be seen coming out into the plastic hose.
- Detach the clear plastic hose from the bleed valve on the caliper.
- Tighten the bleed valve to the specified torque (see Exploded View), and install the rubber cap.
- Check the fluid level.
- After bleeding is done, check the brake for weak braking power, brake drag, and fluid leakage.



- 1 Pump the brake lever until it becomes hard and apply the brake and hold it.
- 2 Quickly open and close the bleed valve while holding the brake applied.
- 3 Release the brake.

WARNING

When working with the disc brake, observe the precautions listed below.

- 1 Never reuse old brake fluid.
- 2 Do not use fluid from a container that has been left unsealed or that has been open for a long time.
- 3 Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.
- 4 Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.
- 5 Don't change the fluid in the rain or when a strong wind is blowing.
- 6 Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely and will eventually deteriorate the rubber used in the disc brake.
- 7 When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high flash point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.
- 8 Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.
- 9 If any of the brake line fittings or the bleed valve is opened at any time, the **AIR MUST BE BLED FROM THE BRAKE.**

11-16 BRAKES

Brake Hose

Removal/Installation Notes

- When removing the brake hose, take care not to spill the brake fluid on the frame or other painted parts.
- When removing the brake hose, temporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum.

CAUTION

- Brake fluid quickly ruins painted or plated surfaces; any spilled fluid should be completely wiped up immediately.
- There is a flat washer on each side of the brake hose fitting. Replace them with new ones when installing it.
- When installing the hoses, avoid sharp bending, kinking, flattening or twisting, and route the hoses according to the Hose Routing section in the General Information chapter.
- Tighten the banjo bolts at the hose fittings to the specified torque (see Exploded View).
- Change the brake fluid after installing the brake hose (see Brake Fluid Change).

Inspection

- The high pressure inside the brake line can cause fluid to leak or the hose to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it.
- ★ Replace it if any cracks or bulges are noticed.

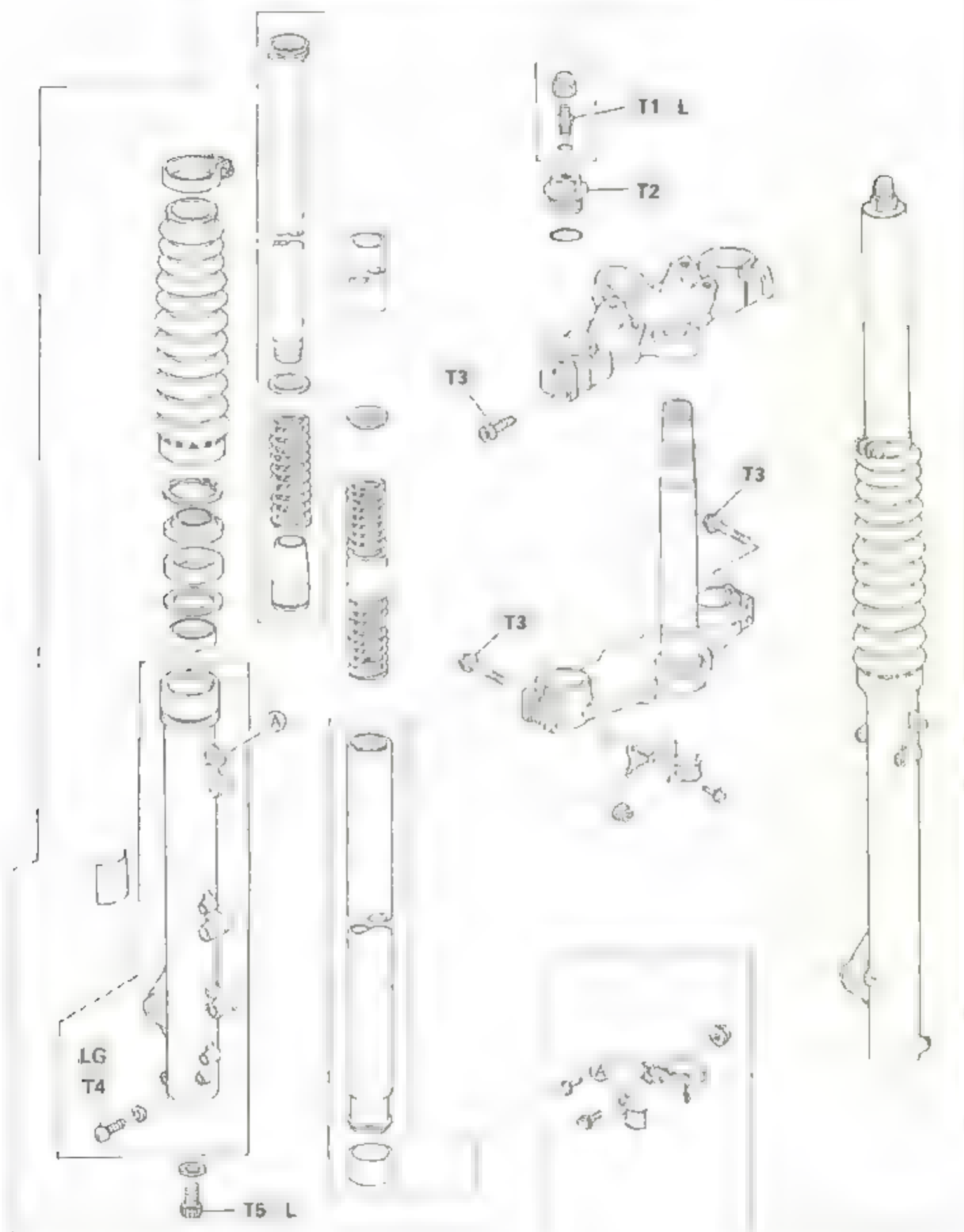
Suspension

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12-2 SUSPENSION

Exploded View



LG: Apply liquid gasket to the threads.

L : Apply a non-permanent locking agent to the threads.

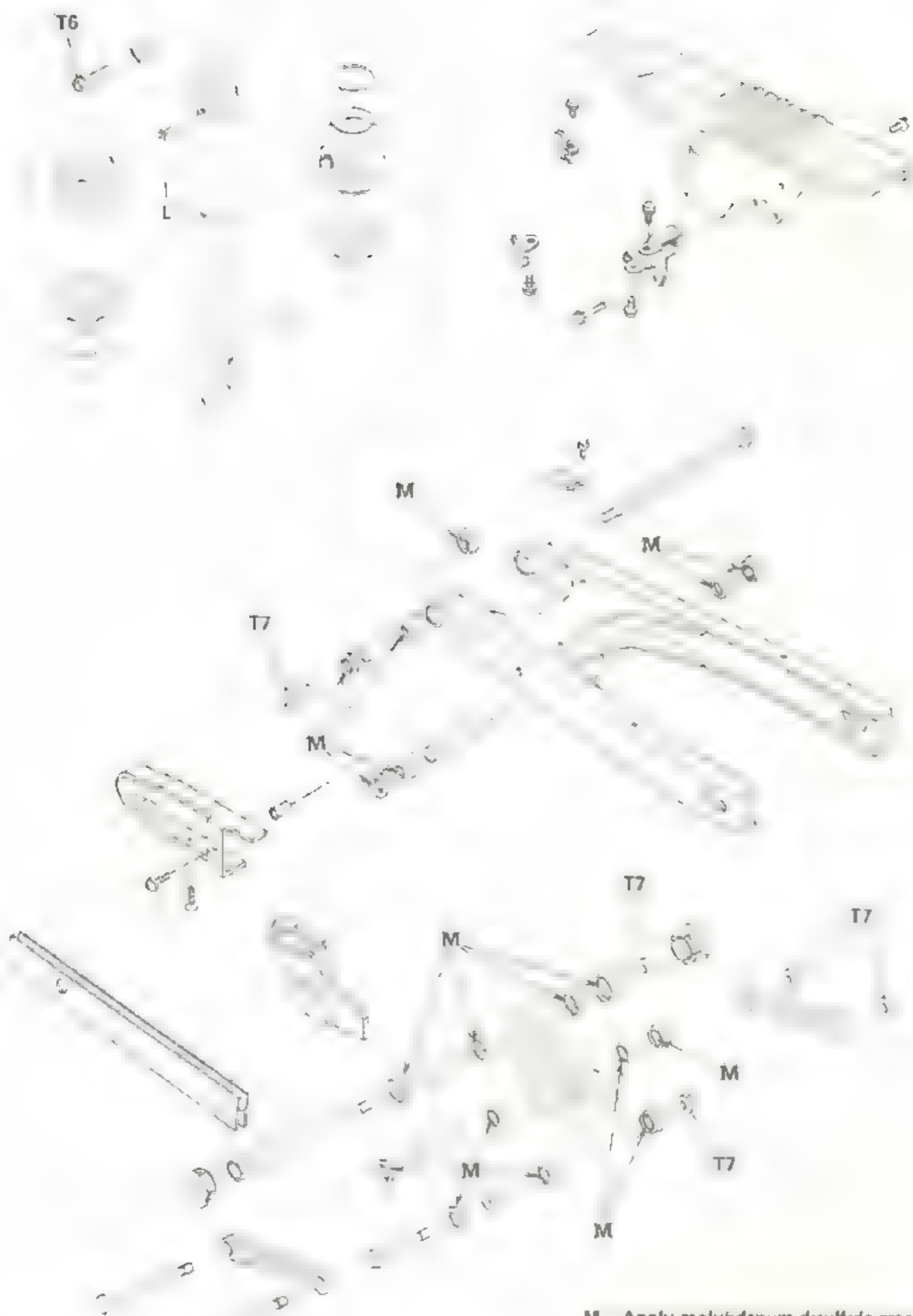
T1: 12 N·m (1.2 kg-m, 8.5 ft-lb)

T2: 29 N·m (3.0 kg-m, 22 ft-lb)

T3: 25 N·m (2.5 kg-m, 18.0 ft-lb)

T4: 1.5 N·m (0.15 kg, 13 in-lb)

T5: 39 N·m (4.0 kg-m, 29 ft-lb)



M Apply molybdenum disulfide grease
 T6: 59 N·m (6.0 kg·m, 43 ft·lb)
 T7: 98 N·m (10.0 kg·m, 72 ft·lb)

12-4 SUSPENSION

Specifications

Item	Standard	Service Limit
Front Fork:		
Air pressure	0 (atmospheric pressure)	
Fork oil		
Viscosity	SAE 10W20	
Amount (per side)		
When changing oil	approx. 320 mL	
After disassembly and completely dry	377 ± 4 mL	
Oil level (fully compressed, without spring)	159 ± 2 mm (from the top of the inner tube)	
Fork spring free length	464.4 mm	455 mm

Special Tools

Jack Stand: 57001-1238



Oil Syringe 57001-1290



Front Fork Cylinder Holder Adapter: 57001-1057



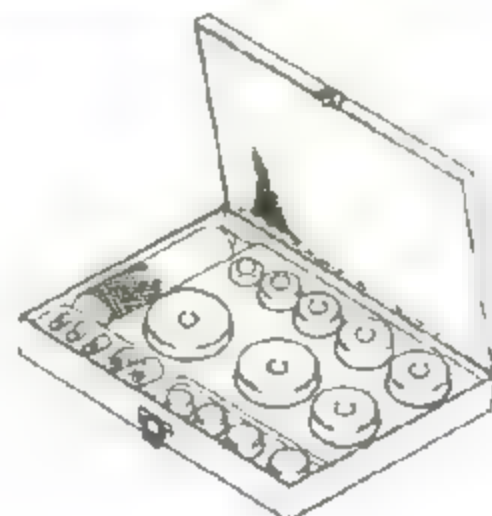
Front Fork Cylinder Holder Handle: 57001-183



Front Fork Oil Seal Driver 57001-1219



Bearing Driver Set 57001-1129



Front Fork

Air Pressure Adjustment

- Remove the lower fairing
- Using the jack stand (special tool 57001-1238), raise the front wheel off the ground
- Remove the air valve cap and push the air valve to open
- Install the air valve cap

Air Pressure

0 (atmospheric pressure)



A. Air Valve

NOTE

- Addition of air pressure is not recommended since atmospheric pressure is the most suitable setting for all ranges of riding

WARNING

- Do not remove the springs and rely on air only. Correct springs must be used in this suspension system. Use without springs can lead to a condition causing accident and injury.
- Do not incinerate the front fork without first removing the air valve or it may explode.

Oil Change

- Release the air in both fork legs through the air valve at the top of the fork leg
- Unscrew the drain screw and top plug, and pull out the spacer, spring seat and fork spring
- Allow the oil to drain into a suitable container. If you pump the fork legs to force out the oil, be sure to catch the oil in a container as it squirts out
- Wash the drain screw threads clean of oil, and blow them dry
- Apply a liquid gasket to the threads of the drain screw and install the screw and a new gasket.
- Tighten the drain screws to the specified torque (see Exploded View)
- Pour in the type and amount of fork oil specified

Fork Oil

Viscosity: SAE 10W20

Amount (per side)

When changing oil: approx. 320 mL

After disassembly and completely dry

377 ± 4 mL

- Adjust the oil level with the oil syringe (special tool)
- Set the oil syringe stopper so that its lower side shows the oil level distance specified

NOTE

- The gauge tube is graduated in 1 cm division.
- The syringe body is graduated in 10 mL division, excluding the gauge tube of about 5 mL capacity

Oil Level (fully compressed, without spring)

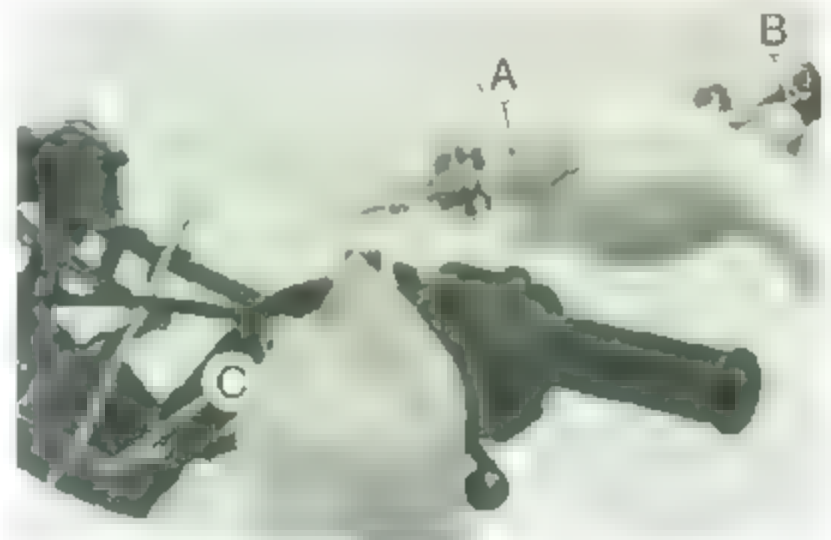
190 ± 2mm (from the top of the inner tube)

- With the fork fully compressed, insert the gauge tube into the inner tube and position the stopper across the inner tube top end

NOTE

- Position the stopper so that the gauge tube is the center of inner tube diameter, or the specified oil level can not get correctly

- Pull the handle slowly to pump out the excess oil until the oil comes out no longer
- ★ If no oil is pumped out, there is insufficient oil in the inner tube. Pour in enough oil, then pump out the excess oil as shown above



A. Oil Syringe 57001-1290

B. Handle

C. Stopper

- Install the parts removed
- Check the O-ring at the top plug and replace it with a new one if damaged.
- Tighten the top plug to the specified torque (see Exploded View)
- Adjust the air pressure.

12-6 SUSPENSION

Removal

- Remove
 - Fairings
 - Speedometer Cable Clamp (for right fork)
 - Brake Hose Clamp (for left fork)
 - Speedometer Cable Lower End
 - Caliper (with hose connected)
 - Front Wheel
 - Front Fender Mounting Bolts
- Loosen the clamp bolts.



A Upper Clamp Bolts B Lower Clamp Bolts

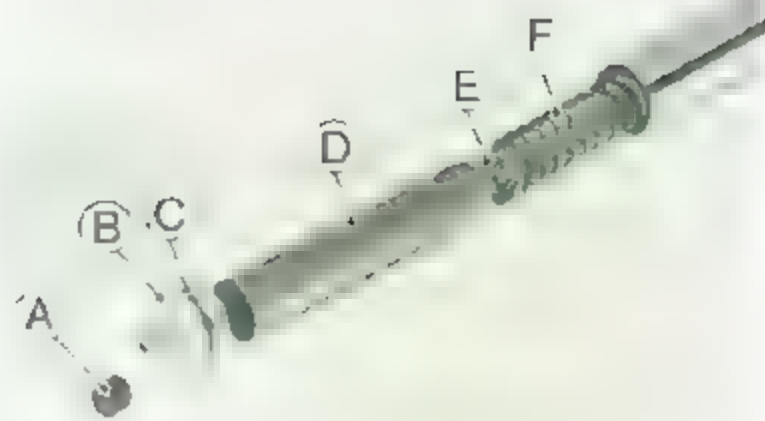
- With a twisting motion work the fork leg down and out

Installation Notes

- If the fork leg was disassembled, adjust the fork oil level
- Route the cables and hose according to the Cable and Hose Routing section in the General Information chapter
- Tighten the lower clamp nuts and upper clamp bolts to the specified torque (see Exploded View)

Disassembly

- Release the air
- Loosen the top plug
- Remove the fork leg
- Remove the rubber boot
- Remove the top plug and O-ring, pull out the spacer, spring seat and spring



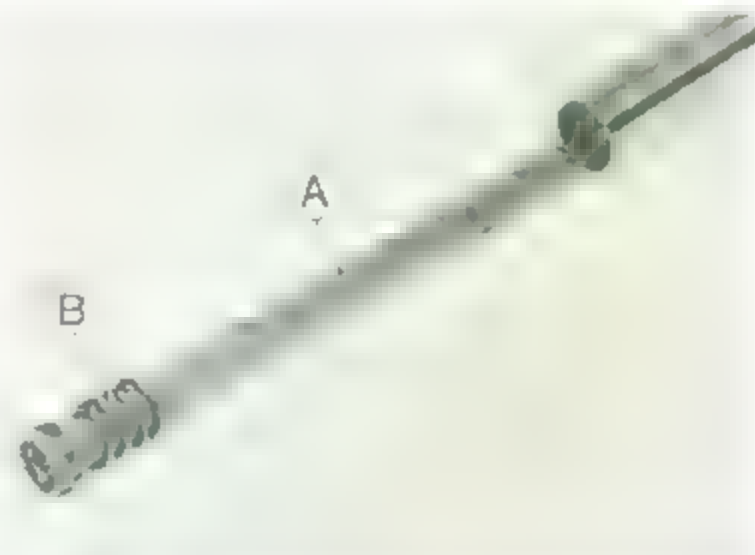
A Air Valve Cap D Spacer
B Top Plug E Spring Seat
C O-ring F Spring

- Pour the fork oil into a container
- Stop the cylinder from turning by using the front fork cylinder holder handle and adapter (special tools). Unscrew the Allen bolt, and take the bolt and gasket out of the bottom of the outer tube



1 Allen Wrench
2 Allen Bolt
3 Cylinder Unit
4 Adapter 57001-1057
5 Front Fork Cylinder Holder Handle 57001-183

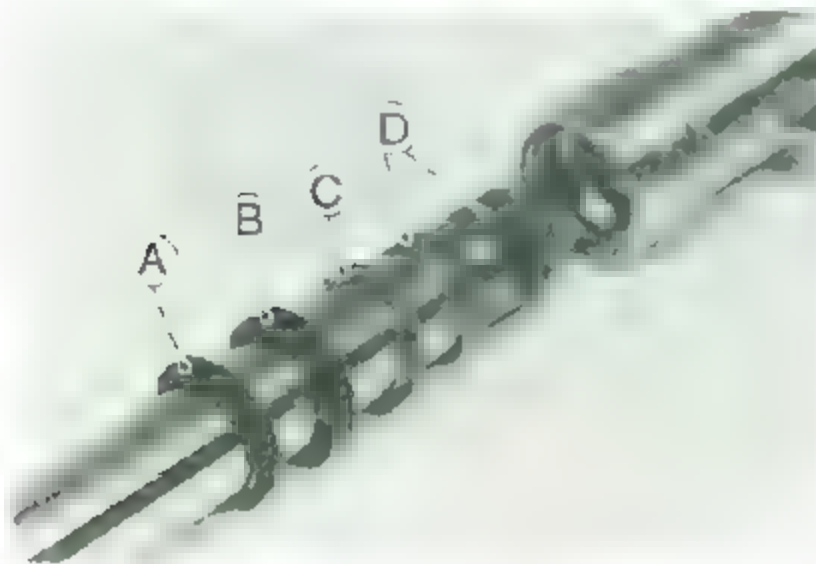
- Remove the cylinder unit and the spring from the top of the front fork tube



A Cylinder Unit B Spring

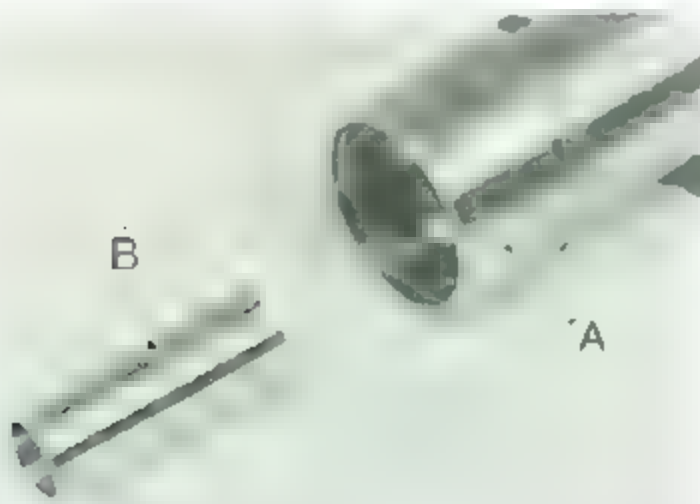
- Remove the retaining ring from the top of the outer tube
- Separate the inner tube with the dust seal, oil seal washer and guide bushes from the outer tube
- Holding the inner tube by hand in a vertical position stroke the outer tube up and down several times and

pull it down. This shock to the fork leg separates the outer tube from the inner tube.



A. Dust Seal
B. Oil Seal
C. Washer
D. Guide Bushes

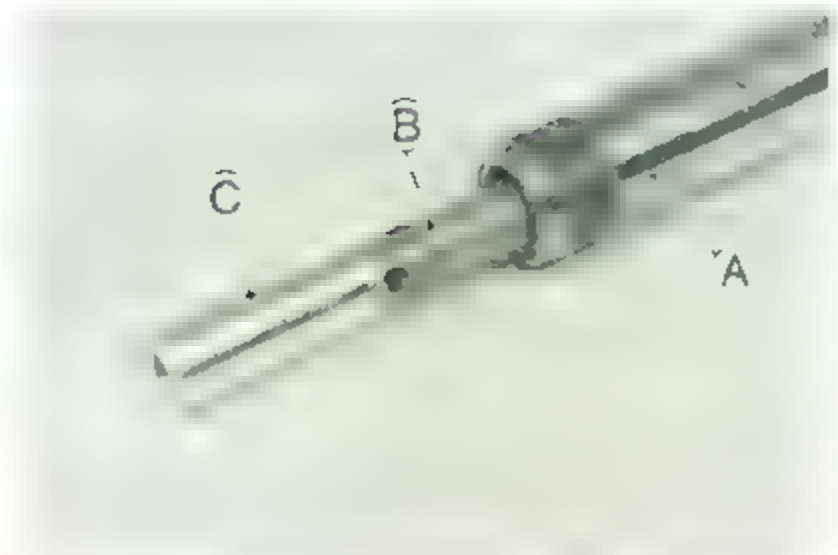
- Remove the dust seal, oil seal, washer and outer tube guide bush from the top of the inner tube.
- Remove the cylinder base from the bottom of the outer tube.



A. Outer Tube
B. Cylinder Base

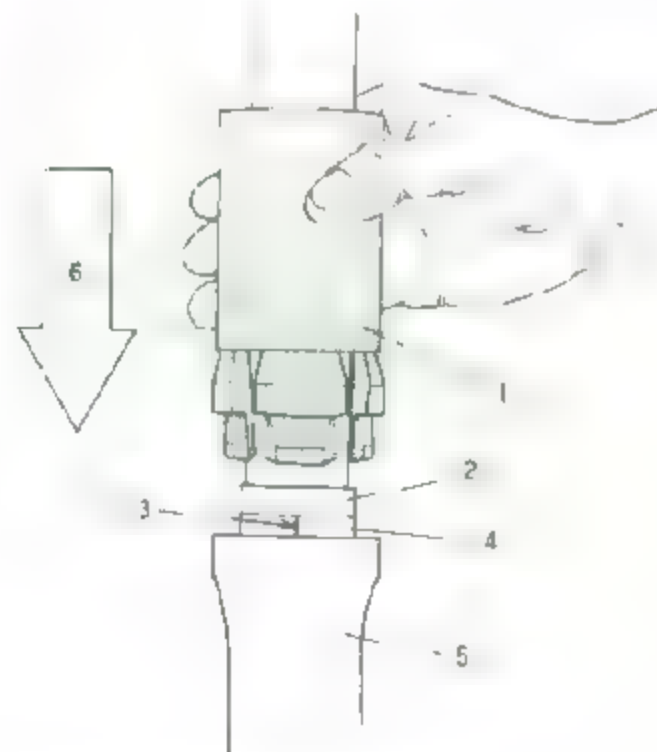
Assembly Notes

- Check the O-ring at the top plug. Replace it with a new one if damaged.
- Replace the oil seal removed with a new one.
- Replace the guide bushes with new ones.
- Insert the cylinder unit and spring in the inner tube.
- Insert the cylinder base in the cylinder unit.



A. Inner Tube
B. Cylinder Unit
C. Cylinder Base

- Insert the inner tube and cylinder unit as a set into the outer tube.
- Apply a liquid gasket to both sides of the gasket, and apply a non permanent locking agent to the threads of the Allen bolt at the bottom of the outer tube.
- Stop the cylinder from turning by using the front fork cylinder holder handle (special tool 57001-183, and adapter (special tool: 57001-1057) tighten the Allen bolt to the specified torque (see Exploded View).
- When replacing the outer tube guide bush with a new one, hold the used guide bush against the new one, and tap the used guide bush with the front fork oil seal driver (special tool) until it stops.



- 1 Front Fork Oil Seal Driver 57001-1219
- 2 Used Guide Bush
- 3 Sit
- 4 New Guide Bush
- 5 Outer Tube
- 6 Tap

12-8 SUSPENSION

- After installing the washer, install the oil seal and dust seal by using the fork oil seal driver (special tool 57001-1219).
- Pour in the type and amount of fork oil specified (see Specifications), and adjust the oil level (see Oil Change).

Inner Tube Inspection

- Visually inspect the inner tube, and repair any damage.
- Nicks or rust damage can sometimes be repaired by using a wet stone to remove sharp edges or raised areas which cause seal damage.
- ★ If the damage is not repairable, replace the inner tube. Since damage to the inner tube damages the oil seal, replace the oil seal whenever the inner tube is repaired or replaced.
- Temporarily assemble the inner and outer tubes, and pump them back and forth manually to check for smooth operation.

CAUTION

- ⚠ If the inner tube is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.

Guide Bush Inspection

- Visually inspect the guide bushes, and replace them if necessary.



A. Guide Bushes

Oil Seal and Dust Seal Inspection

- Inspect the dust seal for any signs of deterioration or damage.
- ★ Replace them if necessary.
- Replace the oil seal with a new one whenever it has been removed.



A. Dust Seal

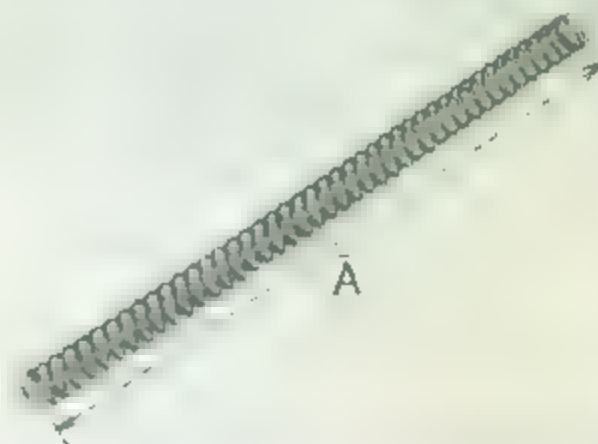
B. Oil Seal

Spring Tension

- Since a spring becomes shorter as it weakens, check its free length to determine its condition.
- ★ If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.

Fork Spring Free Length

Standard:	484.4 mm
Service Limit:	456 mm



A. Free Length

Rear Suspension (Uni-Trak)

Rear Shock Absorber:

Spring Preload Adjustment

The spring preload adjuster on the rear shock absorber has 5 positions so that the spring tension can be adjusted for different road and loading conditions.

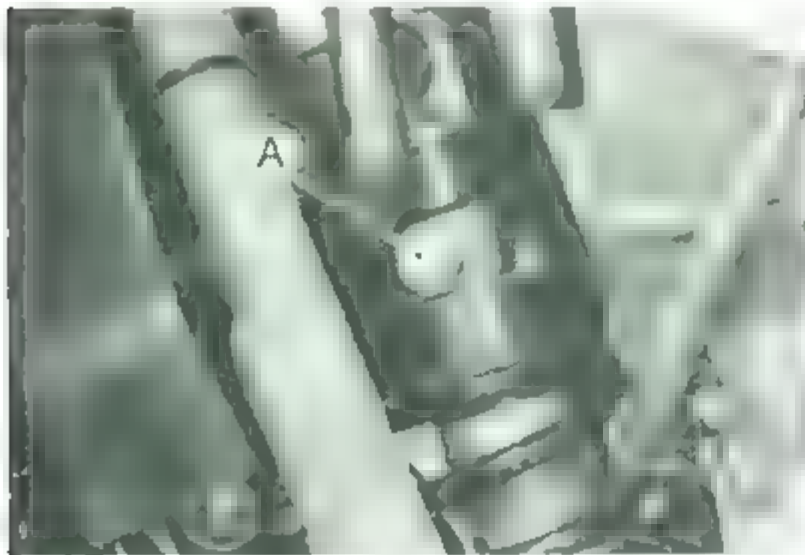
- Using a socket wrench, turn the adjuster to adjust the spring tension.

Spring Preload Adjustment

Adjuster Position	1	2	3	4	5
Spring Tension	+ Stronger				

Riding Condition	An average build rider or a rider with load	A rider and a passenger	A rider and a passenger with load
Adjuster			
Spring Preload	*1 or 2	*2 or 3	*3, 4 or 5

- * Standard Setting



A. Spring Preload Adjuster

Damping Force Adjustment

The damping force adjuster on the rear shock absorber has 4 positions so that the damping force can be adjusted for different road and loading conditions.

- Take off the cover, and turn the adjusting dial to adjust the damping force.

Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
I	Weak	Soft	Light	Good	Low
II					
III					
IV	Strong	Hard	Heavy	Bad	High

Riding Condition	An average build rider or a rider with load	A rider and a passenger	A rider and a passenger with load
Adjuster			
Damping Force	*I or II	*II or III	*III or IV

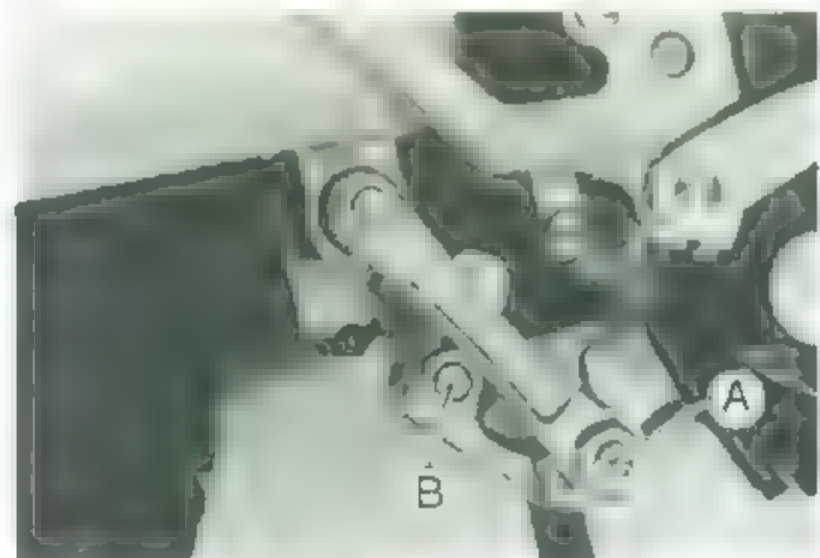
- * Standard Setting



A. Adjusting Dial

Removal

- Remove the lower fanning.
- Using the jack stand (special tool 57001-1238), raise the rear wheel off the ground.
- Unscrew the tie-rod lower mounting nut, and pull out the mounting bolt.
- Unscrew the rear shock absorber lower mounting nut, and pull out the mounting bolt.

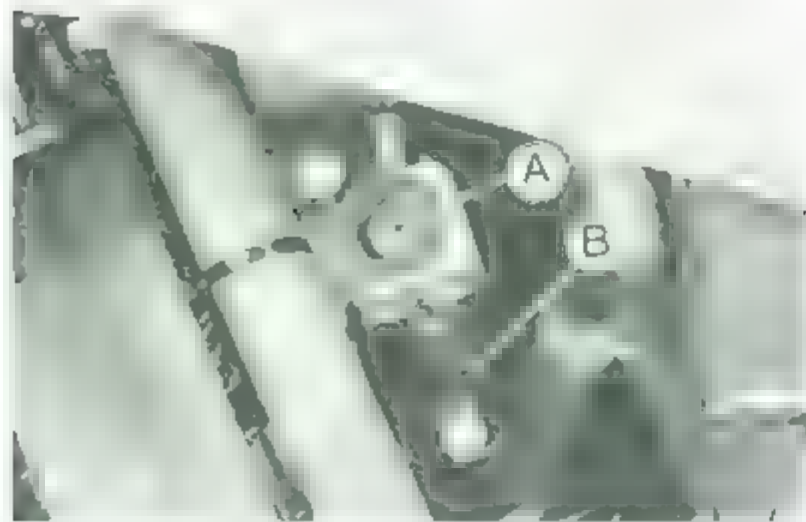


A. Tie Rod Lower Mounting Bolt

B. Rear Shock Absorber Lower Mounting Bolt

- Pull off the engine breather upper end.
- Remove the rear shock absorber upper mounting bolt, and pull the rear shock absorber down and out.

12-10 SUSPENSION



A. Rear Shock Absorber B. Upper Mounting Bolt

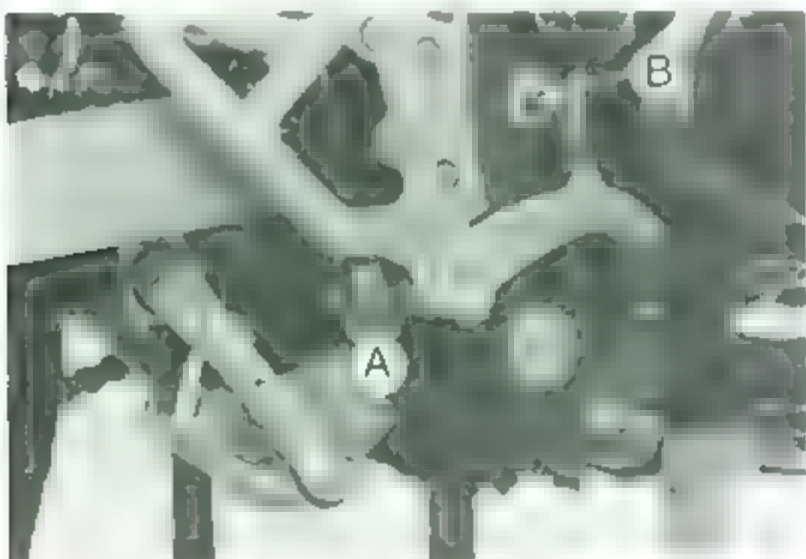
Installation Note

- Tighten the following to the specified torque (see Exploded View)
 - Rear Shock Absorber Upper Mounting Bolt
 - Rear Shock Absorber Lower Mounting Nut
 - Tie-Rod Lower Mounting Nut

Swing Arm:

Removal

- Remove the rear wheel (see Rear Wheel Removal in the wheels/Tires chapter)
- Remove the air cleaner oil reservoir
- Remove the tie rod upper mounting bolt
- Pull out the swing arm pivot shaft, and remove the swing arm



A. Tie Rod B. Swing Arm Pivot Shaft

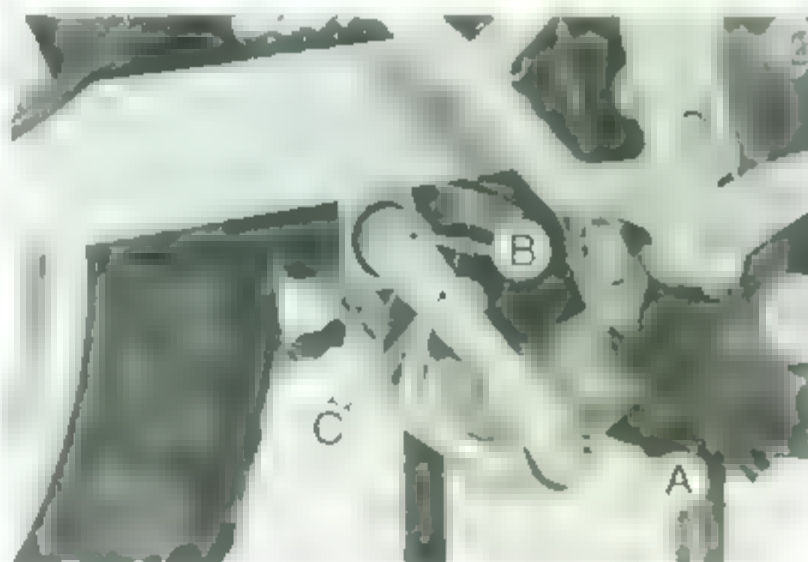
Installation Notes

- Apply plenty of molybdenum disulfide grease to the inside of the needle bearings, and oil seals
- Tighten the following to the specified torque (see Exploded View)
 - Swing Arm Pivot Nut
 - Tie-Rod Upper Mounting Nut
- Route the following through the clamp (see Hose Routing in the General Information chapter)
 - Carburetor Air Vent Tube
 - Carburetor Drain Tube
 - Air Cleaner Drain Tube
 - Fuel Tank Breather Hose
 - Battery Vent Hose
- Refer to the Wheels/Tires, Final Drive, and Brakes chapters for wheel installation

Tie-Rod, Rocker Arm:

Tie-Rod Removal

- Remove the lower fender
- Using the jack stand (special tool, 57001-1238), raise the rear wheel off the ground
- Remove the tie-rod lower mounting bolt
- Remove the tie-rod upper mounting bolt, and then take out the tie-rods



A. Lower Mounting Bolt B. Upper Mounting Bolt C. Tie-Rods

Tie-Rod Installation Notes

- Apply plenty of molybdenum disulfide grease to the inside of the needle bearings and oil seals
- Tighten following to the specified torque (see Exploded View)
 - Tie-Rod Upper Mounting Nut
 - Tie-Rod Lower Mounting Nut

Rocker Arm Removal

- Remove the lower fairing
- Using the jack stand (special tool 57001 1238) raise the rear wheel off the ground



- A. Tie-Rod Lower Mounting Bolt
- B. Rear Shock Absorber Lower Mounting Bolt
- C. Engine Mounting Bolt
- D. Swing Arm Pivot Shaft
- E. Rocker Arm Pivot Shaft
- F. Rocker Arm

- Remove the tie-rod lower mounting bolt
- Remove the rear shock absorber mounting bolt
- Loosen the engine mounting bolt
- Loosen the swing arm pivot shaft
- Pull out the rocker arm pivot shaft, and remove the rocker arm

Rocker Arm Installation Notes

- Apply plenty of molybdenum disulfide grease to the inside of the needle bearings, and oil seal and between them
- Tighten the following parts to the specified torque in the following order (see Exploded View)
 1. Swing Arm Pivot Nut
 2. Rocker Arm Pivot Nut
 3. Engine Mounting Nut
- Tighten the rear shock absorber lower mounting nut and the tie rod lower mounting nut to the specified torque (see Exploded View)

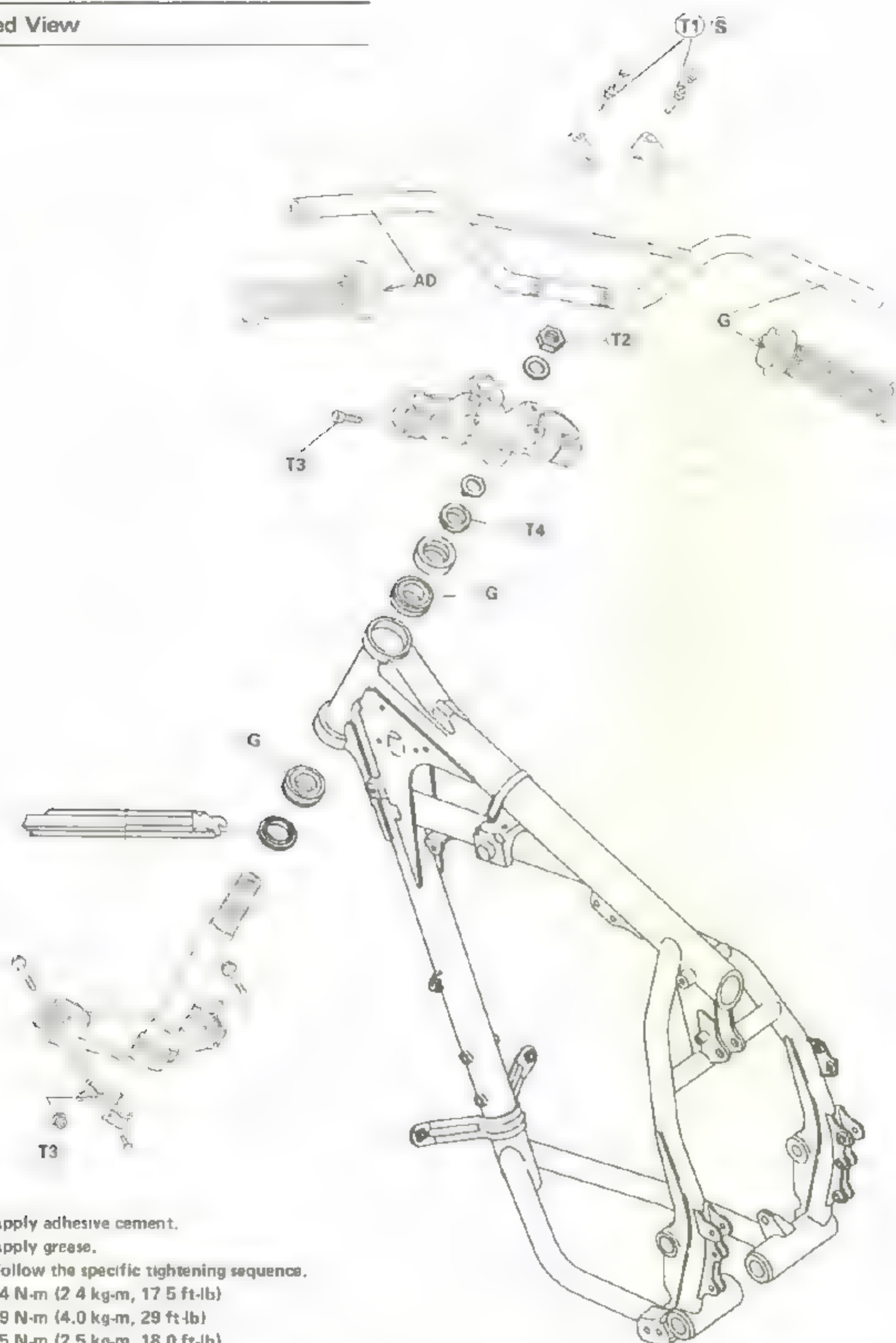
Steering

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13-2 STEERING

Exploded View



AD: Apply adhesive cement.

G : Apply grease.

S : Follow the specific tightening sequence.

T1 : 24 N·m (2.4 kg-m, 17.5 ft-lb)

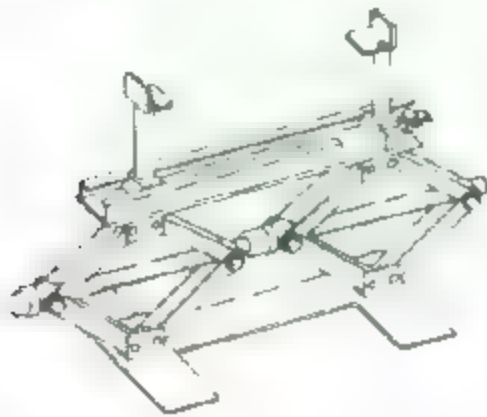
T2 : 39 N·m (4.0 kg-m, 29 ft-lb)

T3 : 25 N·m (2.5 kg-m, 18.0 ft-lb)

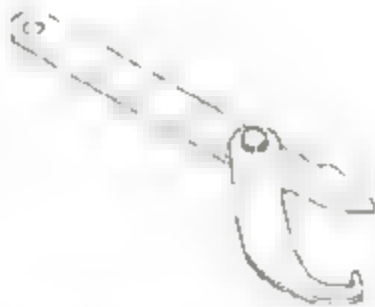
T4 : Hand-tighten (about 4.9 N·m, 0.5 kg-m, 43 in-lb)

Special Tools

Jack Stand: 57001-1238



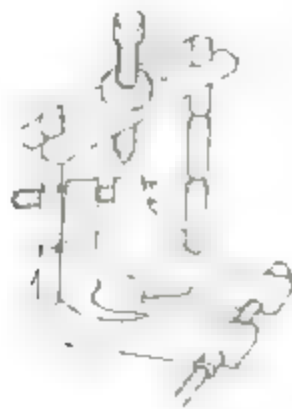
Steering Stem Nut Wrench: 57001-1100



Head Pipe Outer Race Remover: 57001-1107



Bearing Puller 57001-158



Bearing Puller Adapter: 57001-317



Head Pipe Outer Race Press Shaft: 57001-1075



Head Pipe Outer Race Driver: 57001-1106



Head Pipe Outer Race Driver: 57001-1076



Stem Bearing Driver: 57001-137



Steering Stem Bearing Driver Adapter 57001-1074

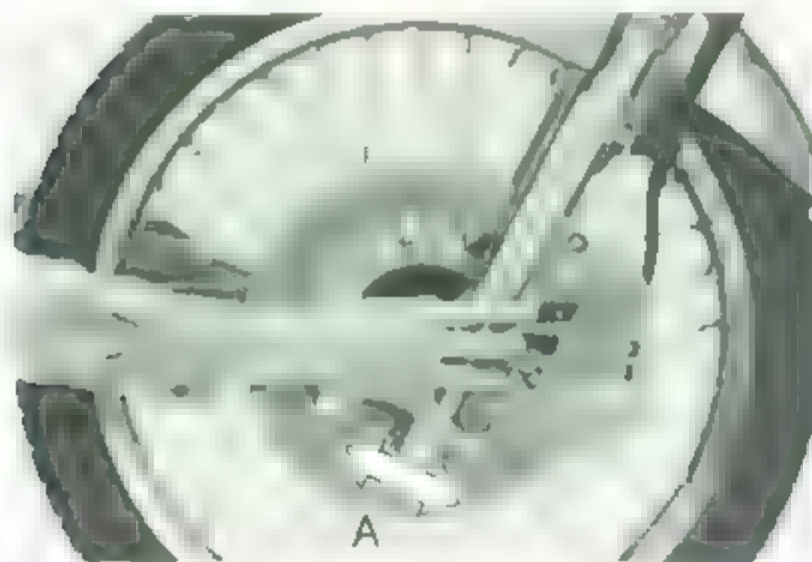


13-4 STEERING

Steering Adjustment

Inspection

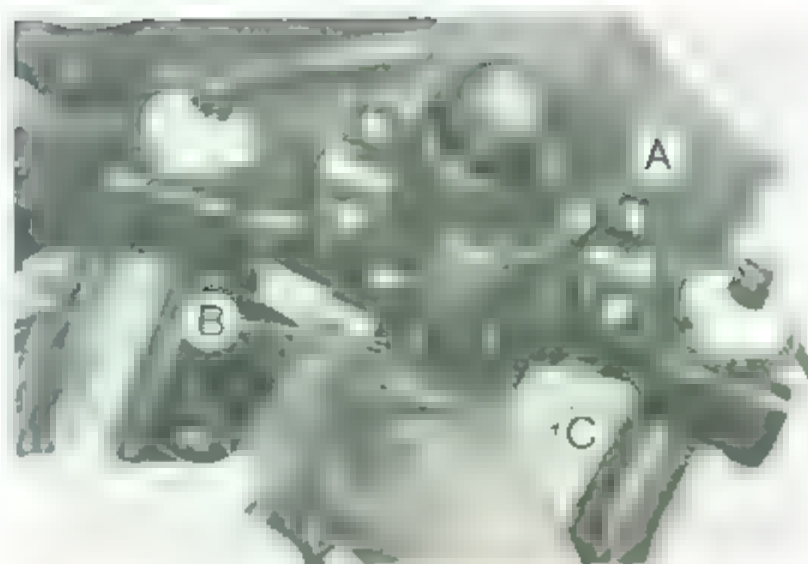
- Remove the lower fairing
- Using the jack stand (special tool 57001-1238), raise the front wheel off the ground
- With the front wheel pointing straight ahead, alternately nudge each end of the handlebar. The front wheel should swing fully left and right from the force of gravity until the fork hits the stop
- ★ If the steering binds or catches before the stop, check the routing of the cables, hoses, and harnesses.
- ★ If the steering feels tight, adjust or lubricate the steering.
- Feel for steering looseness by pushing and pulling the forks
- ★ If you feel looseness, adjust the steering.



A. Push and pull

Adjustment

- Remove
 - Upper Fairing
 - Side Covers
 - Seat
 - Fuel Tank
 - Handlebar Clamps
 - Handlebar (place on one side)
- Loosen the fork lower clamp nuts.
- Loosen the stem head nut
- Remove the lower fairing
- Using the jack stand (special tool 57001-1238), raise the front wheel off the ground
- Using the steering stem nut wrench (special tool), adjust the steering
- ★ If the steering is too tight, loosen the stem locknut a fraction of a turn; if the steering is too loose, tighten the locknut a fraction of a turn. Turn the locknut 1/8 turn at a time maximum
- Tighten the following to the specified torque (see Exploded View)
 - Steering Stem Head Nut
 - Front Fork Lower Clamp Nuts
 - Handlebar Clamp Bolts



A. Steering Stem Head Nut
B. Steering Stem Locknut
C. Steering Stem Nut Wrench, 57001-1100

- Check the steering again
- ★ If the steering is still too tight or too loose in spite of correct adjustment, inspect the steering stem parts

Steering Removal/Installation

Removal

- Remove:
 - Fairings
 - Side Covers
 - Seat
 - Fuel Tank
 - Front Wheel
 - Front Fender
 - Handlebar (place on one side)
 - Front Fork
- Remove the steering stem head nut and washer
- Remove the steering stem head
- Take off the lockwasher.
- Push up on the stem base, and remove the steering stem locknut with the steering stem nut wrench (special tool), then remove the steering stem and stem base (single unit)



A. Stem Base
B. Steering Stem Nut Wrench 57001-1100
C. Steering Stem Locknut
D. Steering Stem

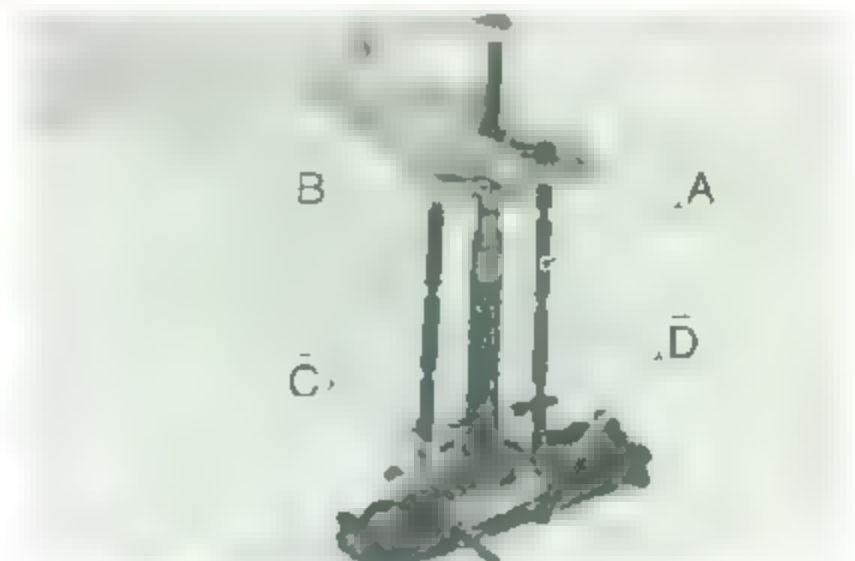
- Remove the steering stem cap and upper tapered roller bearing inner race
- To remove the outer races pressed into the head pipe, install the head pipe outer race remover (special tool) as shown below, and hammer the stem bearing remover to drive it out.

NOTE

If either steering stem bearing is damaged, it is recommended that both the upper and lower bearings (including outer races) should be replaced with new ones.

1 Head Pipe Outer Race Remover 57001-1107

- Remove the lower inner race (with its grease seal) which is pressed onto the steering stem, with the bearing puller and adapter (special tools)
- Remove the plug from the top of the stem before setting the bearing puller adapter.

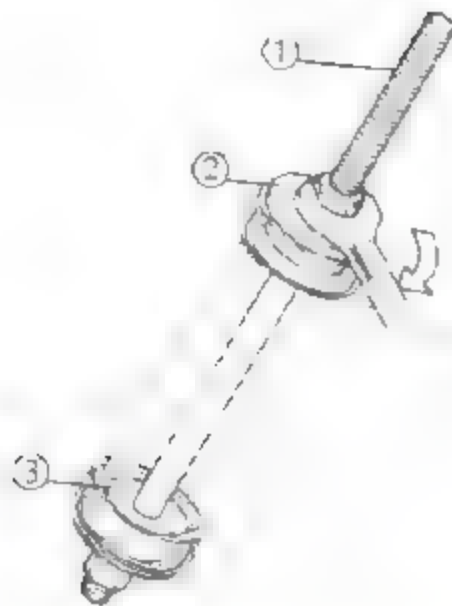


A. Bearing Puller 57001-158 C. Bearing Inner Race
B. Adapter 57001-317 D. Stem Base

Installation

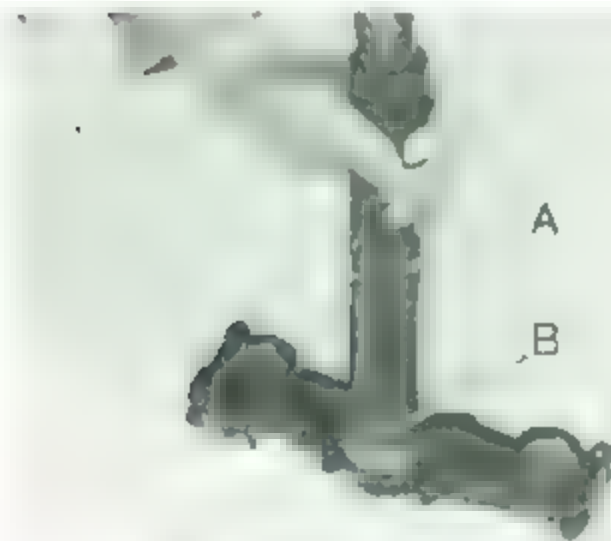
- Apply grease to the outer races, and then drive them into the head pipe using the head pipe outer race press shaft and drivers (special tools)

13-6 STEERING



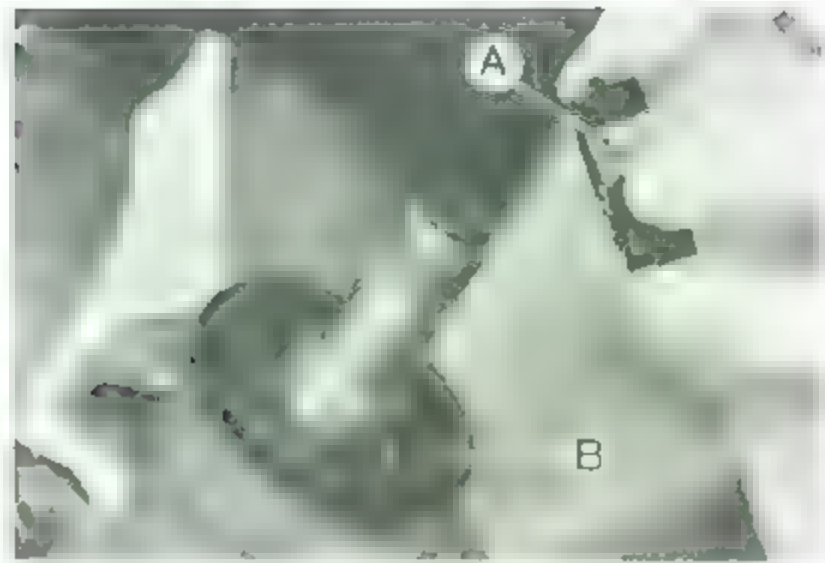
1. Head Pipe Outer Race Press Shaft 57001-1075
2. Head Pipe Outer Race Driver 57001-1108
3. Head Pipe Outer Race Driver 57001-1076

- Apply grease to the tapered roller bearing, and drive it onto the steering stem using the stem bearing driver and adapter (special tools)



- A. Stem Bearing Driver 57001-137
- B. Adapter 57001-1074

- Lubricate the steering stem bearings with grease.
- Install the stem locknut so that the notched side faces down.
- Install the lockwasher, steering stem head, washer, and nut.
- Loosely install the nut at this time

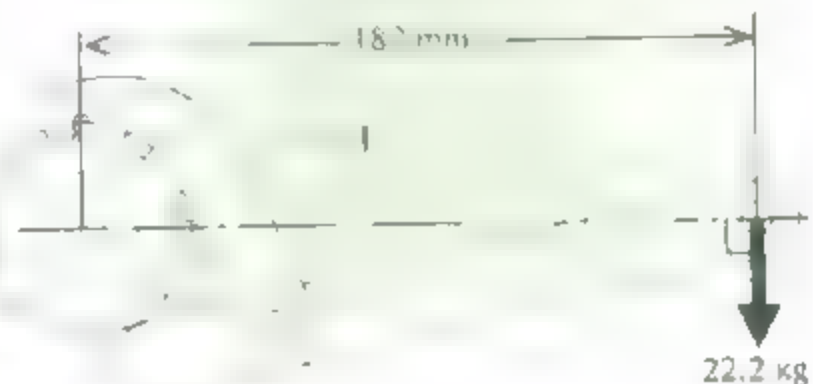


A. Notch Side

B. Cap

The following four steps should be performed after steering bearing installation. This procedure settles the bearings in place.

- Using the steering stem nut wrench (special tool), tighten the stem locknut to 39 N·m (4.0 kg·m 29 ft·lb) of torque. (To tighten the steering stem locknut to the specified torque, hook the wrench on the stem locknut, and pull the wrench at the hole by 22.2 kg force in the direction shown.)



1 Steering Stem Nut Wrench 57001-1100

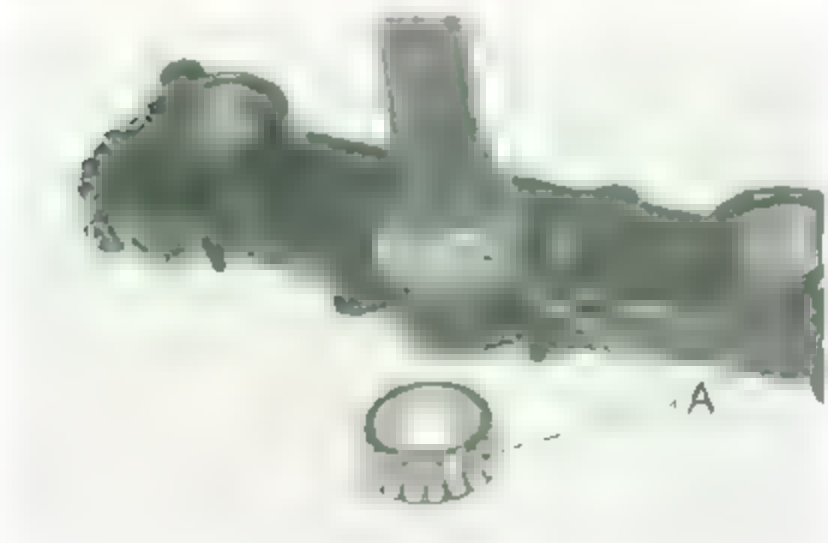
- Check that there is no play and the steering stem turns smoothly without rattles. If not, the steering stem bearings may be damaged.
- Again back out the stem locknut a fraction of a turn until it turns lightly.
- Turn the stem locknut lightly clockwise until it just becomes hard to turn. Do not overtighten, or the steering will be too tight.
- Install the removed parts (see appropriate chapters).
- Route the cables, wires and hoses correctly (see Cable, Wire, and Hose Routing in the General Information chapter).
- Adjust the steering (see Steering Adjustment)

Steering Maintenance

Bearing Lubrication

In accordance with the Periodic Maintenance Chart lubricate the steering stem bearings.

- Remove the steering stem.
- Using a high flash-point solvent, wash the upper and lower tapered roller bearings in the cages, and wipe the upper and lower outer races, which are press-fitted into the frame head pipe, clean of grease and dirt.
- Visually check the outer races and the rollers.
- ★ Replace the bearing assemblies if they show wear or damage.
- Pack the upper and lower tapered roller bearings in the cages with grease, and apply a light coat of grease to the upper and lower outer races.
- Install the steering stem, and adjust the steering.



A. Steering Stem Bearings

Bearing Wear, Damage

- Using a high flash-point solvent, wash the upper and lower tapered rollers in the cages, and wipe the upper and lower outer races, which are press-fitted into the frame head pipe, clean of grease and dirt.
- Visually check the outer races and the rollers.
- ★ Replace the bearing assemblies if they show damage.

Grease Seal Deterioration, Damage

- Inspect the grease seal on the upper tapered roller bearing for any signs of deterioration or damage.
- ★ Replace the grease seal if necessary.

Stem Warp

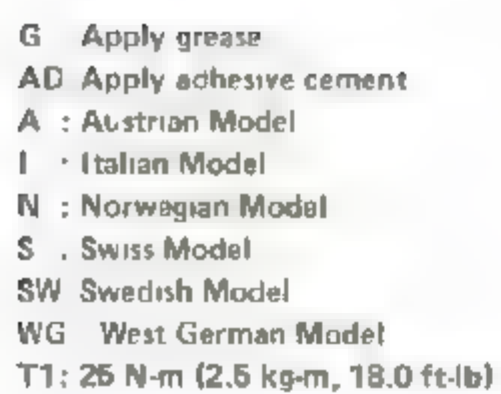
- Whenever the steering stem is removed, or if the steering cannot be adjusted for smooth action, check the steering stem for straightness.
- ★ If the steering stem shaft is bent, replace the steering stem.

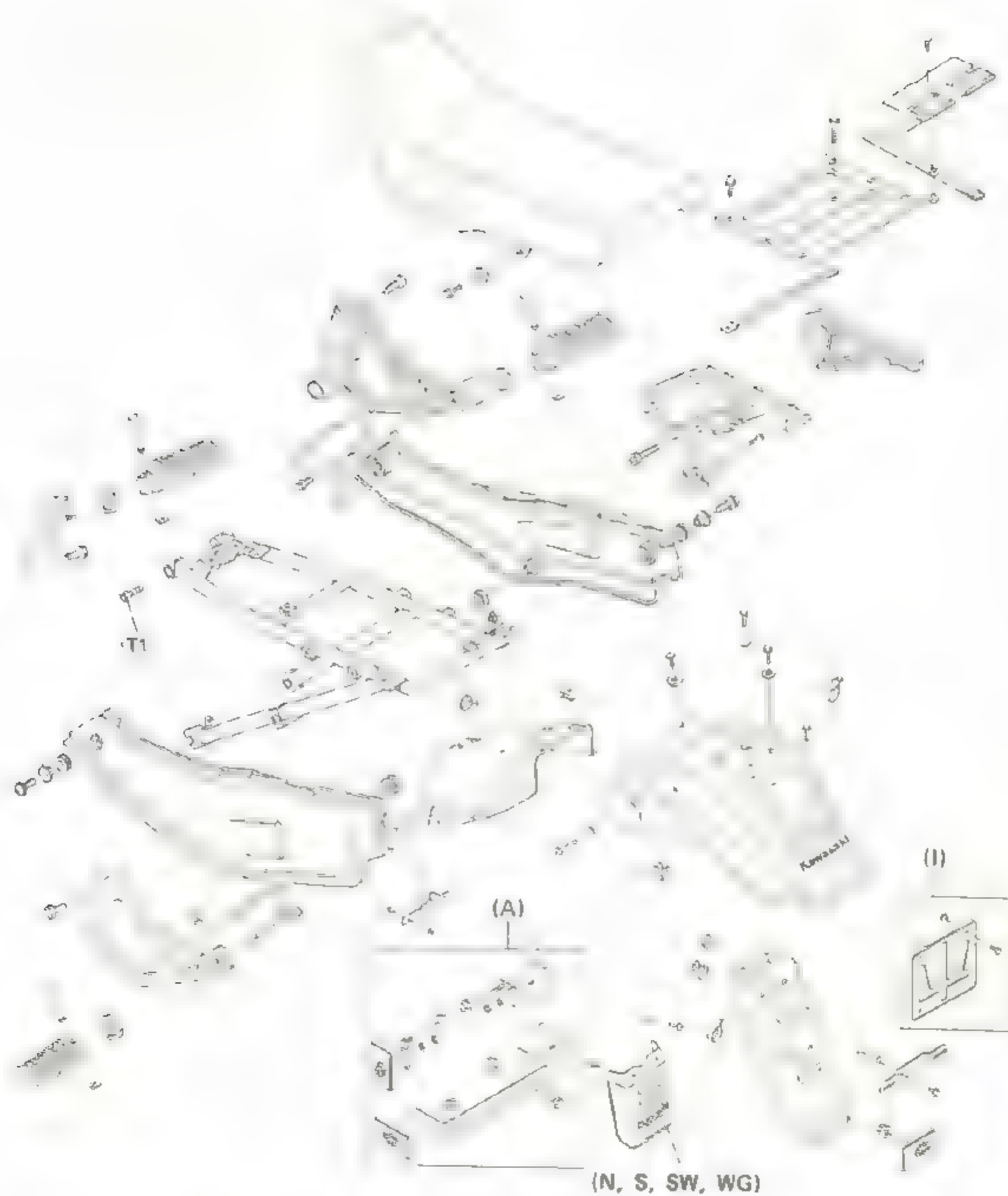
Frame

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Exploded View





14-4 FRAME

Rear Frame

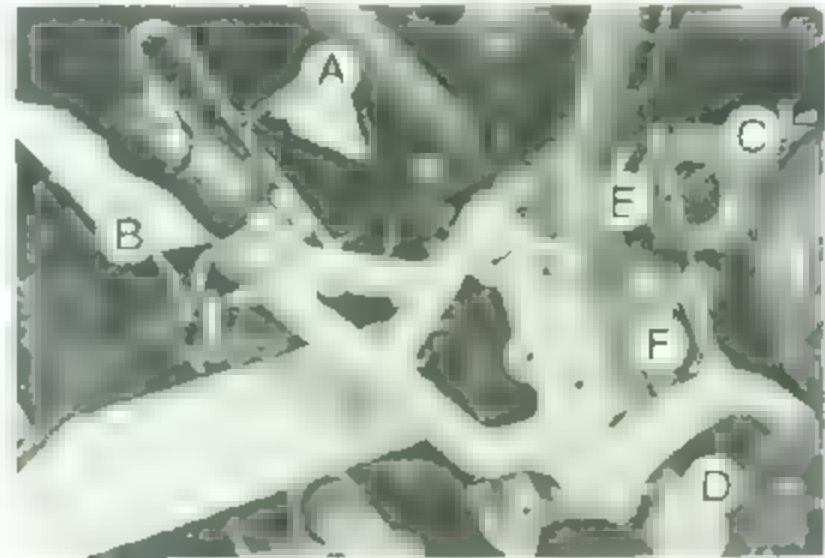
Removal/Installation

- Refer to Air Cleaner Housing Removal/Installation Notes in the Fuel System chapter

Footpeg Brackets

Right Footpeg Bracket Removal

- Remove the foot guard, and unlit the brake hose grommet from the guard
- Unhook the rear brake light switch spring lower end, and remove the brake pedal
- Pull out the cotter pin, and remove the joint pin



- A Foot Guard
- B Brake Hose Grommet
- C Brake Light Switch Spring
- D Joint Pin
- E Master Cylinder Mounting Bolts
- F Footpeg Bracket Mounting Bolts

- Unscrew the rear master cylinder mounting and right footpeg bracket mounting bolts, and take off the bracket
- Remove the brake shaft and return, spring out of the bracket

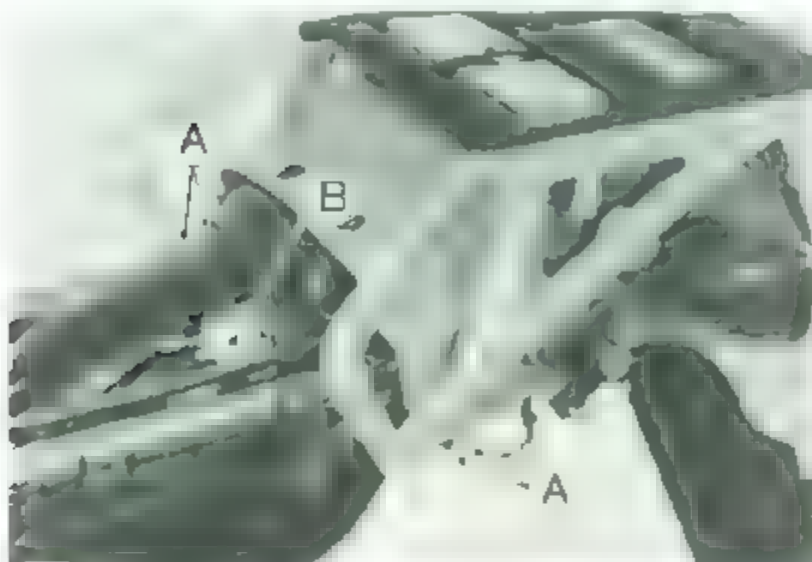
Right Footpeg Bracket Installation Notes

- After tightening the right footpeg bracket mounting bolts, hook the rear brake switch spring lower end and install the master cylinder mounting bolts while pushing down the brake pedal
- Tighten the rear master cylinder mounting bolts to the specified torque (see the Brakes chapter)
- Check the brake pedal position and the rear brake light switch operation (see the Brakes, and the Electrical System chapter)

Fenders

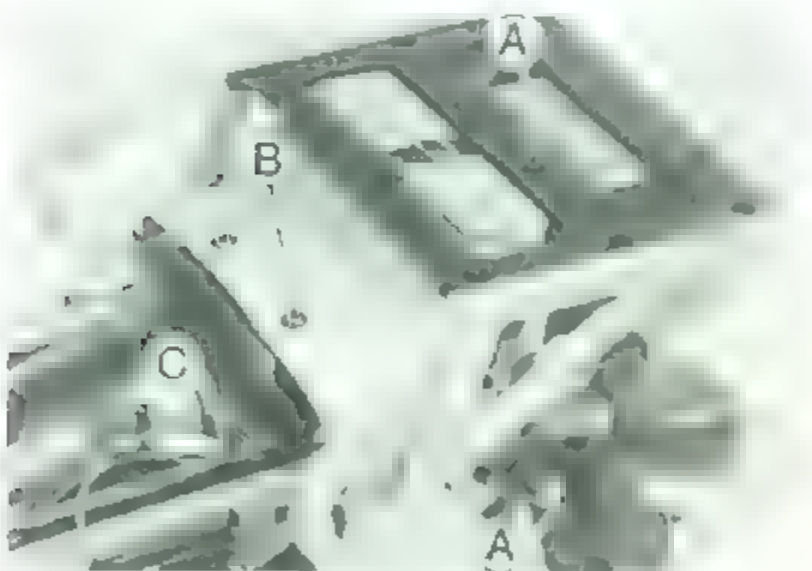
Rear Fender Rear Section Removal

- Remove
 - Side Covers
 - Seat
- Disconnect :
 - Turn Signal Light Connectors
 - Main Harness Connector



A Turn Signal Light Lead Connectors
B Main Harness Connector

- Remove the carrier with the grips, turn signal lights and helmet lock



A Carrier Mounting Bolts
B Fender Connecting Screws
C Coolant Reservoir Vent Hose

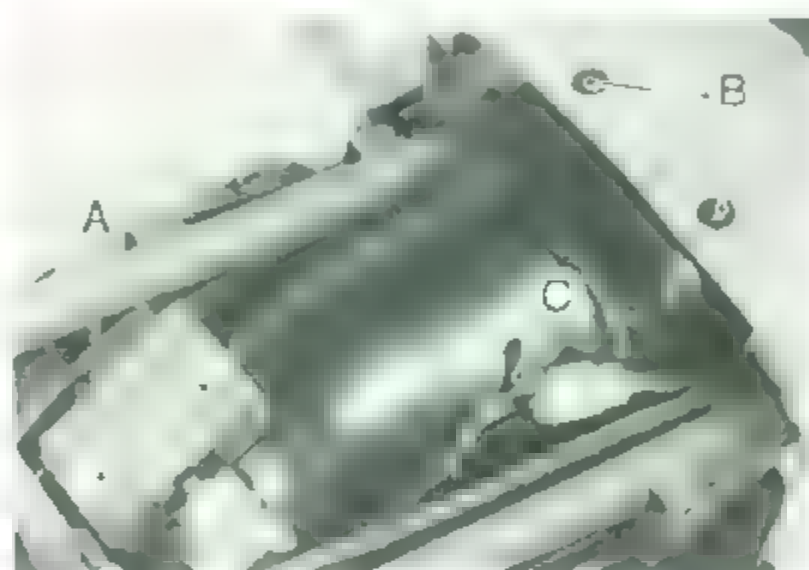
- Unscrew the fender connecting screws
- Pull off the coolant reservoir vent hose from the rear fender rear section
- Take off the rear fender rear section with the flap

Rear Fender Rear Section Installation Note

- Route the coolant reservoir vent hose through the clamp on the rear fender rear section (see Hose Routing in the General Information chapter)

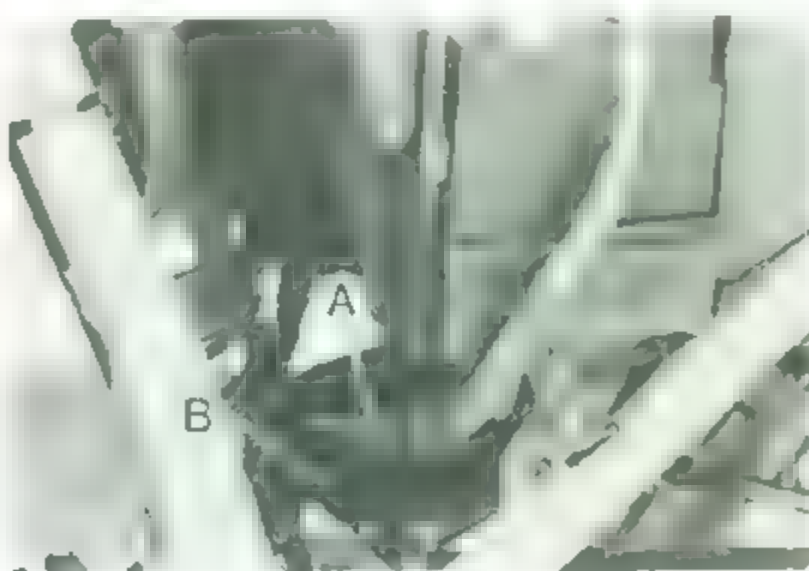
Rear Fender Front Section Removal

- Remove
 - Side Covers
 - Seat
- Unscrew the regulator/rectifier mounting bolts
- Unscrew the fender connecting screws.
- Remove the harness clamp



A Regulator/Rectifier Mounting Bolts
B Fender Connecting Screws
C Harness Clamp

- Pull the battery vent hose out of the clamp.



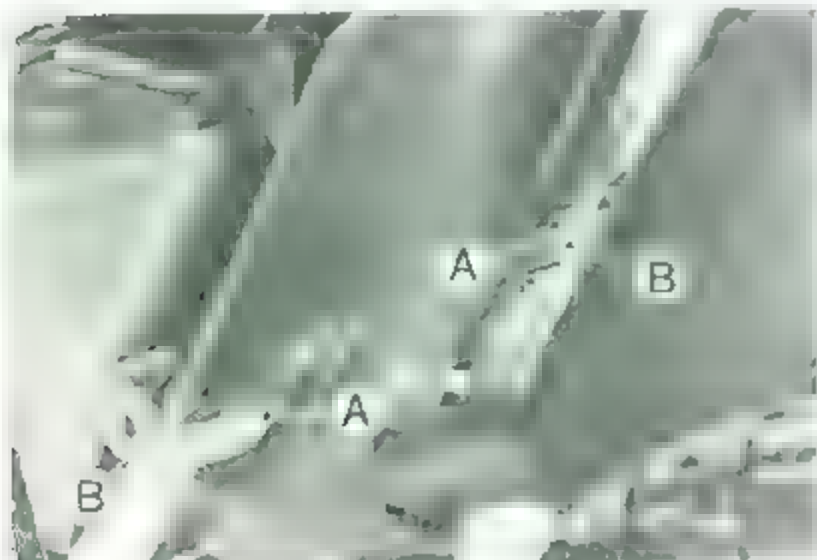
A Battery Vent Hose B Clamp

- Unfit the flaps from the slit in the frame and take off the rear fender front section.

14-6 FRAME

Rear Fender Front Section Installation Notes

- When installing the rear fender front section, fit the flaps into the slit in the rear frame.



A. Slit

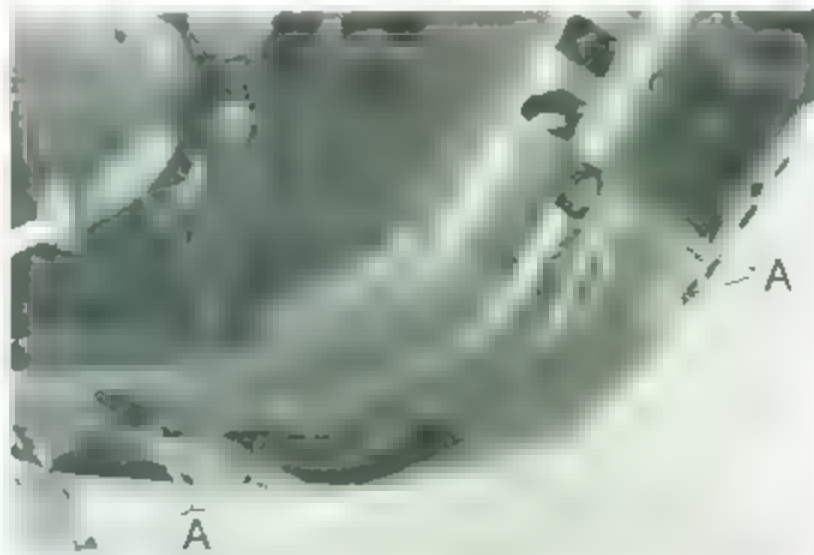
B. Flaps

- Route the battery vent hose through the clamp on the front of the fender (see Hose Routing in the General Information chapter).

Fairings

Lower Faring Removal

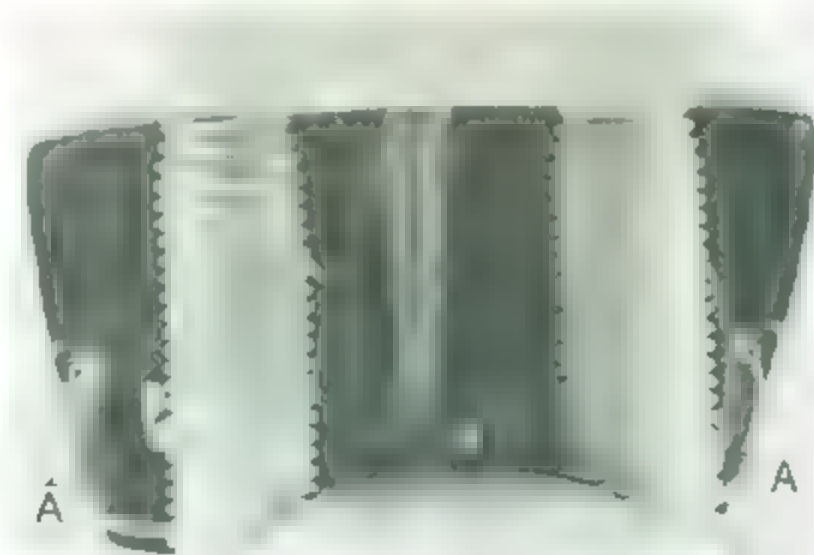
- Unscrew the mounting bolts, take off the lower fairing.



A. Mounting Bolts

Upper Faring Removal

- Unscrew the mounting screws and bolt.



A. Mounting Bolts



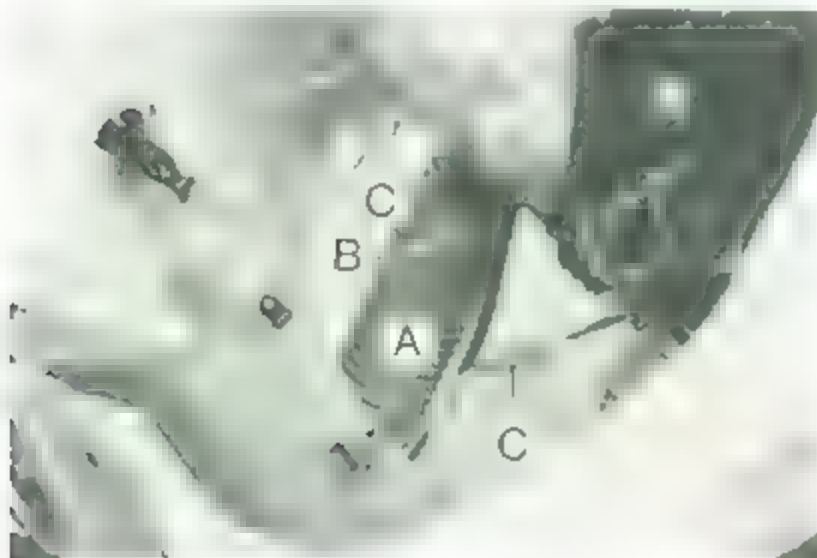
A. Mounting Screws

- Pull the bosses off the fuel tank, and pull off the fairing to the frontward.

- Disconnect the turn signal light lead connectors, and take off the fairing to the frontward.

Upper Fairing Installation Note

- Fit the center boss on the fairing into the hole in the stay



- A. Center Boss
- B. Hole
- C. Turn Signal Light Lead Connectors

Inner Fairing Removal

- Remove the upper fairing
- Disconnect ,
Meter Lead Connector
Speedometer Cable Upper End
- Remove the meter bracket mounting bolt, and take off the meter unit.
- Unscrew the mounting screws, and take off the fairing



- A. Meter Lead Connector
- B. Speedometer Cable Upper End
- C. Meter Bracket Mounting Bolts
- D. Fairing Mounting Screws

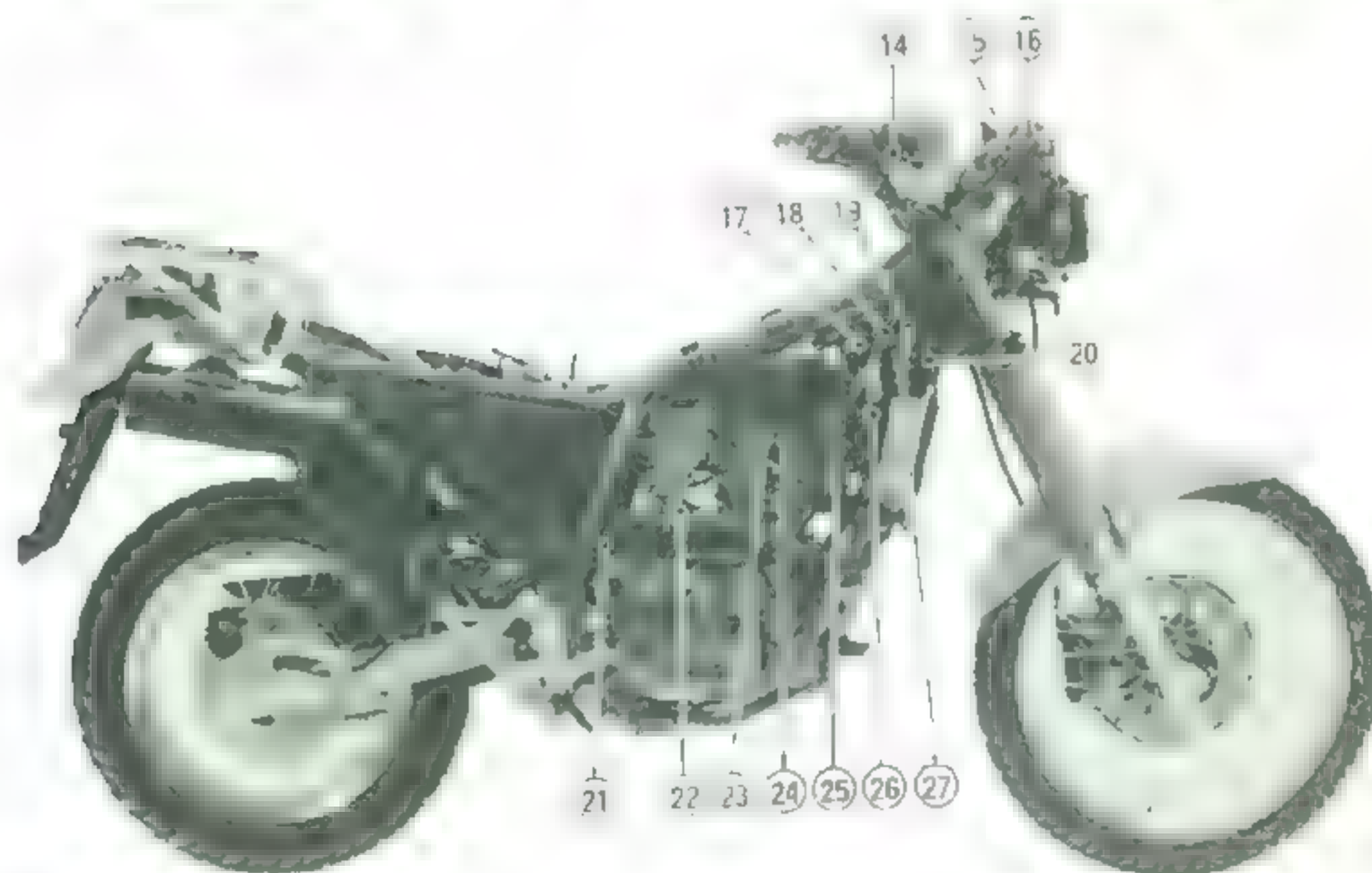
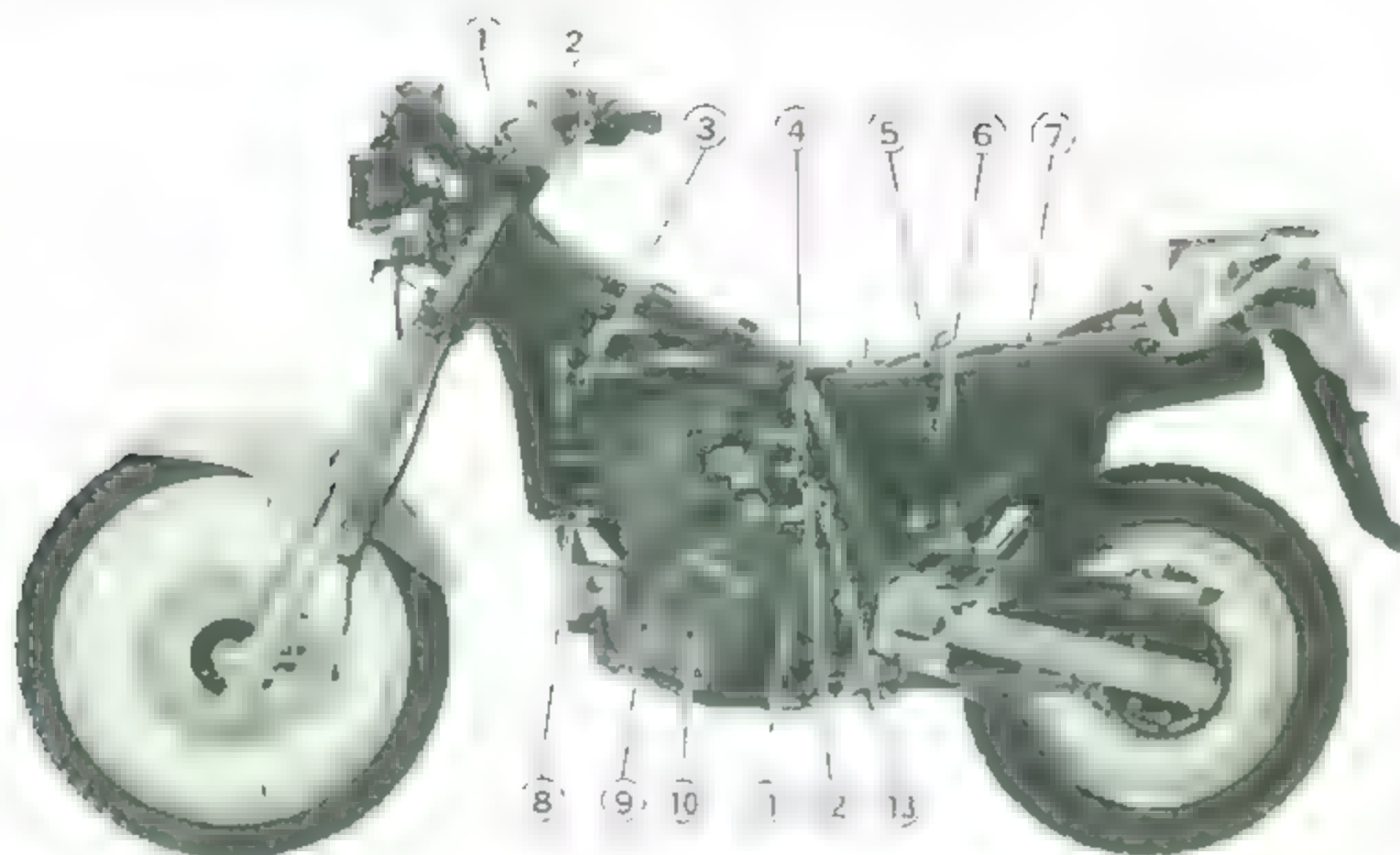
Electrical System

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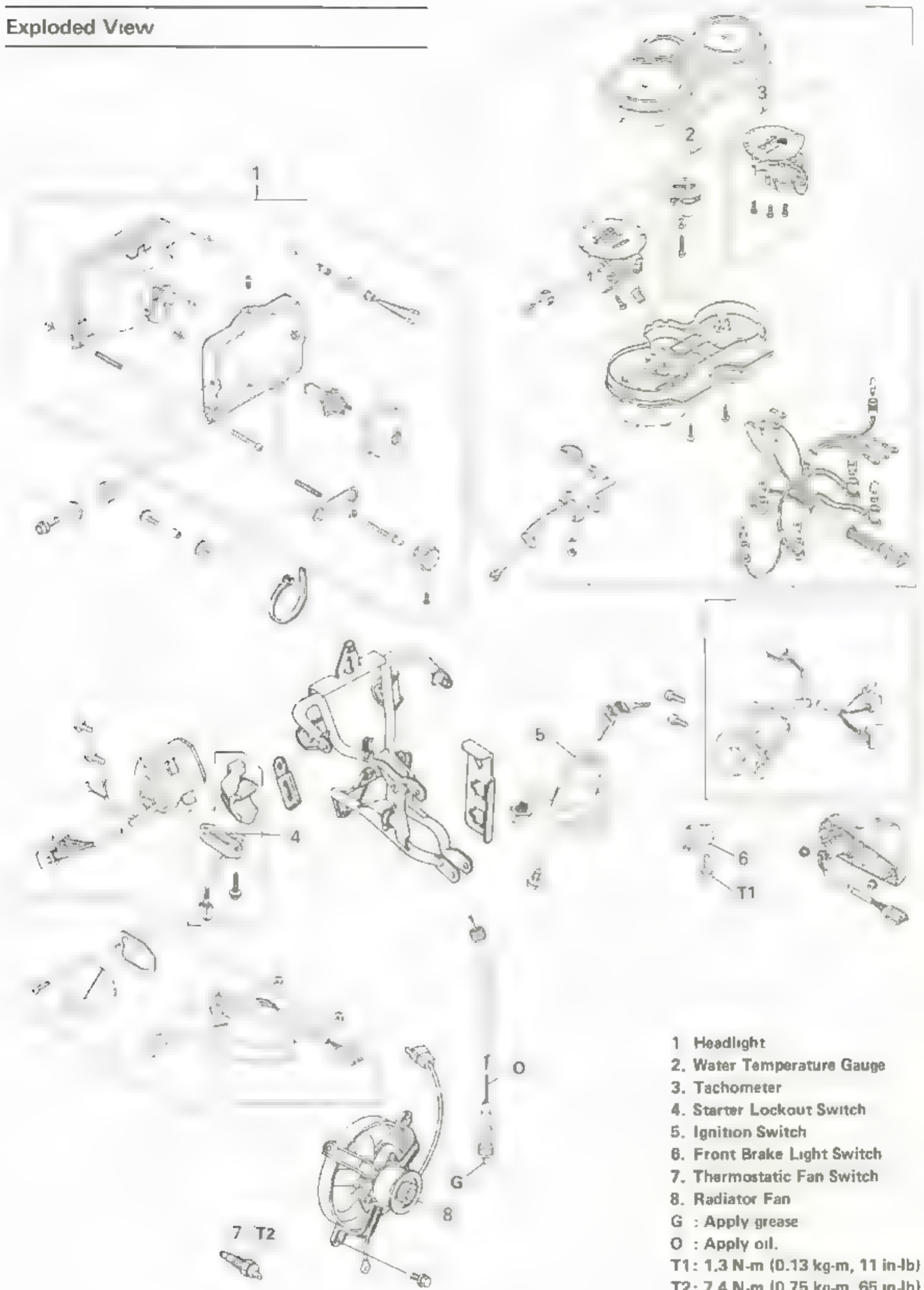
15 2 ELECTRICAL SYSTEM

Parts Location



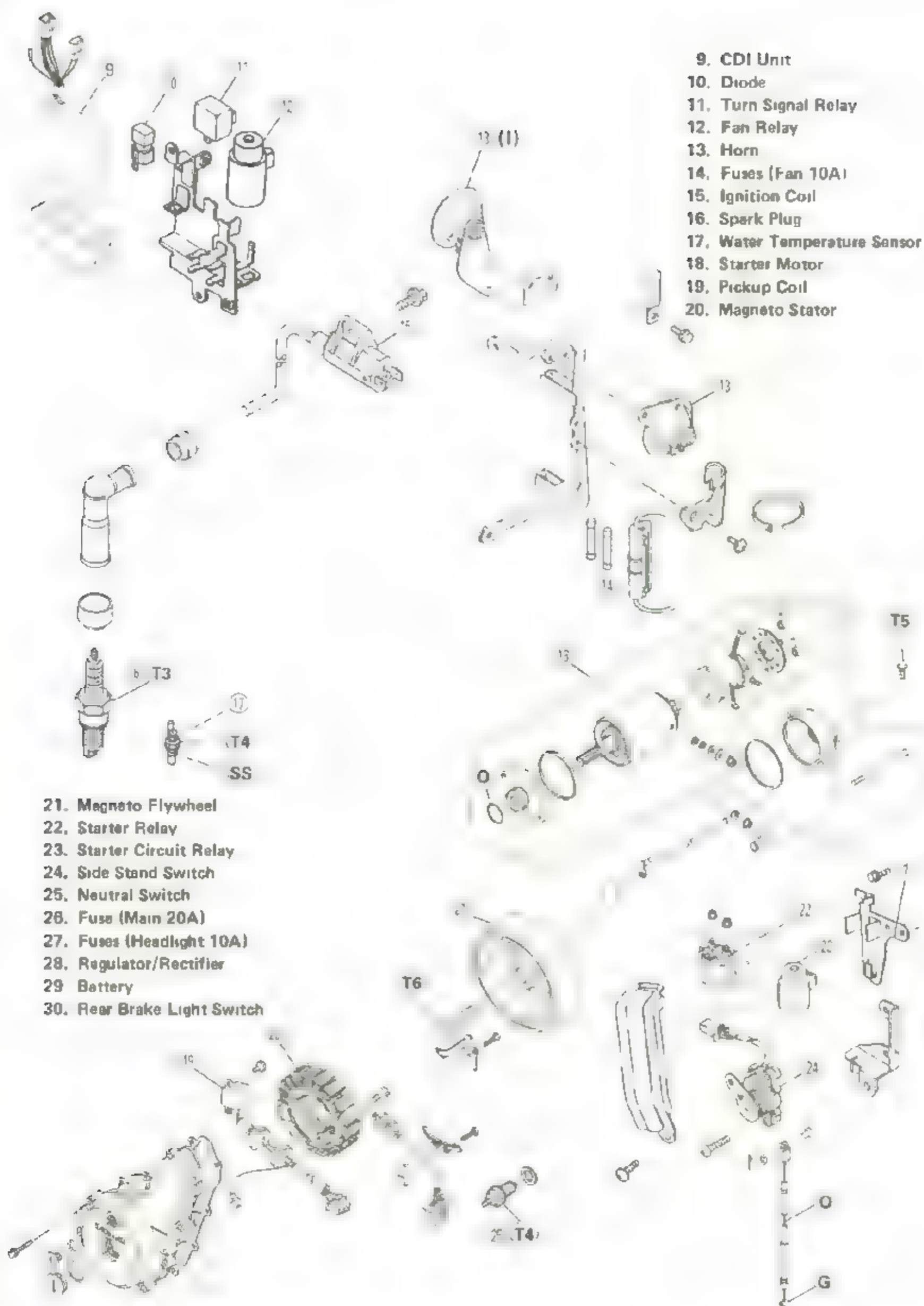
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|------------------------------------|------------------------------|------------------------------|
| 1. Ignition Switch | 10. Flywheel Magneto | 19. Diode |
| 2. Starter Lockout Switch | 11. Neutral Switch | 20. CDI Unit |
| 3. Radiator Fan | 12. Starter Circuit Relay | 21. Rear Brake Light Switch |
| 4. Starter Relay | 13. Side Stand Switch | 22. Starter Motor |
| 5. Fuses (Main 20A, Headlight 10A) | 14. Front Brake Light Switch | 23. Water Temperature Sensor |
| 6. Battery | 15. Tachometer | 24. Spark Plug |
| 7. Regulator/Rectifier | 16. Water Temperature Gauge | 25. Ignition Coil |
| 8. Thermostat & Fan Switch | 17. Fan Relay | 26. Fuse (Fan 10A) |
| 9. Pickup Coil | 18. Turn Signal Relay | 27. Horn |

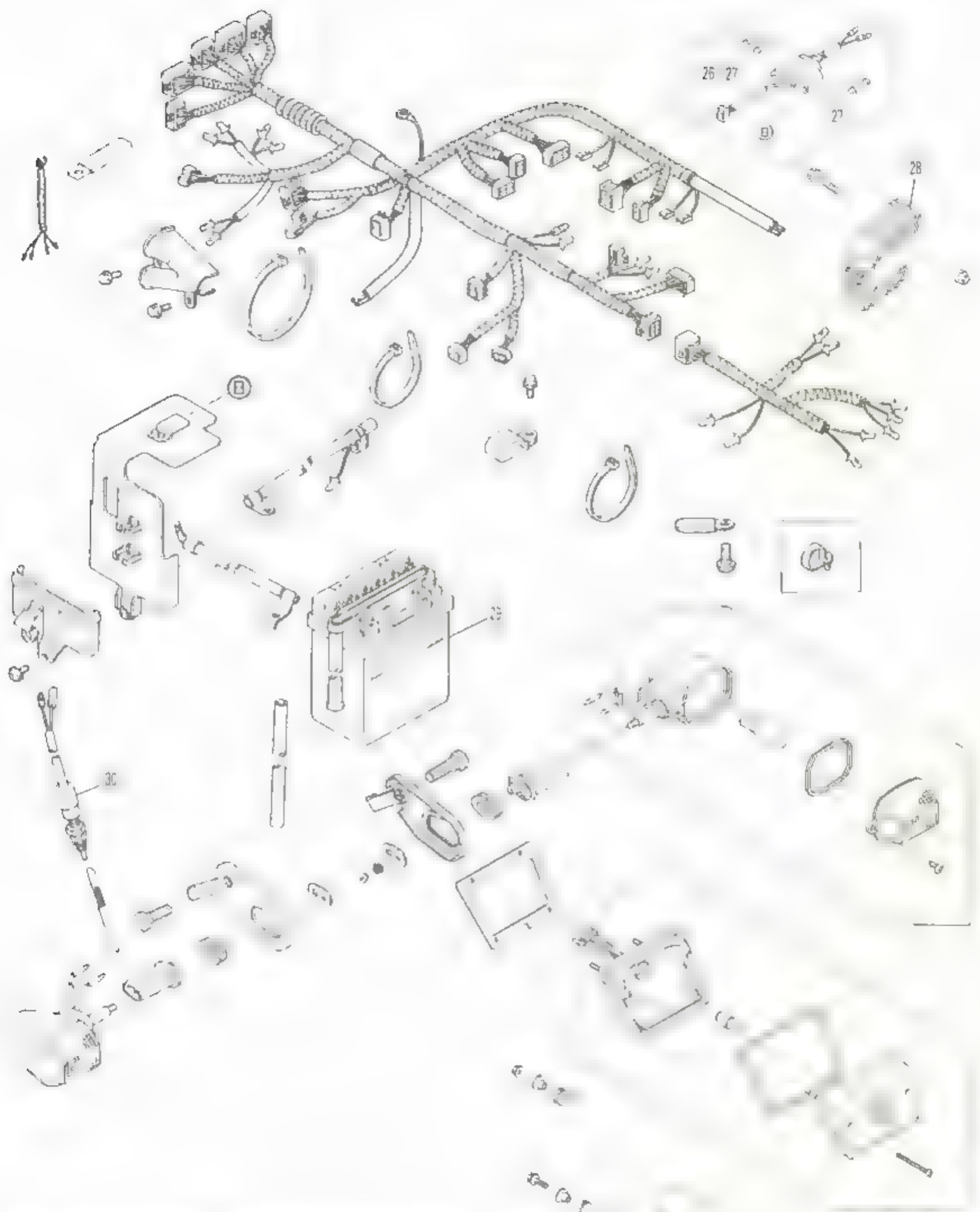
Exploded View



- 1 Headlight
- 2 Water Temperature Gauge
- 3 Tachometer
- 4 Starter Lockout Switch
- 5 Ignition Switch
- 6 Front Brake Light Switch
- 7 Thermostatic Fan Switch
- 8 Radiator Fan
- G : Apply grease
- O : Apply oil.
- T1: 1.3 N-m (0.13 kg-m, 11 in-lb)
- T2: 7.4 N-m (0.75 kg-m, 65 in-lb)

15-4 ELECTRICAL SYSTEM





SS: Apply silicone sealant (Kawasaki Bond, 56019-120) to the threads.

I: Italian Model

T3: 14 N·m (1.4 kg-m, 10.0 ft-lb)

T4: 15 N·m (1.5 kg-m, 11.0 ft-lb)

T5: 9.8 N·m (1.0 kg-m, 7.0 ft-lb)

T6: 195 N·m (20 kg-m, 145 ft-lb)

15-6 ELECTRICAL SYSTEM

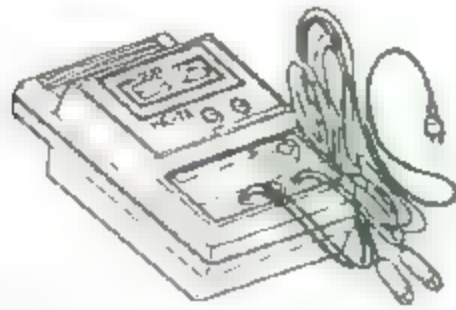
Specifications

Item	Standard	Service Limit
Battery:		
Type	12 V 14 Ah	-
Electrolyte level	Between upper and lower levels	---
Electrolyte amount	870 mL, 145 mL per one cell	---
Specific gravity of electrolyte	1.280 @20°C (68°F)	-
Charging System:		
Type	Three phase AC	---
Magneto output voltage	Not less than 34 V @4 000 r/min (rpm)	---
Charging coil resistance	0.3 ~ 1.0 Ω (Y - Y)	---
Charging voltage (regulator/rectifier output voltage)	Battery ~ 15 V (with headlight switch ON if applicable)	---
Ignition System:		
Ignition timing	From 10° BTDC @1 300 r/min (rpm) to 30° BTDC @3 300 r/min (rpm)	---
Ignition coil		
3 needle arcing distance	7 mm or more	---
Winding resistance		
Primary windings	0.15 ~ 0.21 Ω	---
Secondary windings	3.8 ~ 5.8 kΩ	---
Spark plug		
Type	NGK DPR8EA-9 or ND X24EPR-U9 (I)(SA)NGK DP8EA-9 or ND X24EP-U9	--
Spark plug gap	0.8 ~ 0.9 mm	---
CDI unit internal resistance	Refer to page 21	---
Pickup coil resistance	100 ~ 150 Ω (BK - BK/Y)	---
Exciter coil resistance	100 ~ 200 Ω (R - W)	-
Electric Starter System:		
Starter motor:		
Brush length	12.0 ~ 12.5 mm	6 mm
Commutator diameter	28 mm	27mm
Switch and Sensor:		
Brake light timing	On after about 15 mm pedal travel	---
Fan switch connections		
Rising temperature	From OFF to ON at 94 ~ 100°C (201 ~ 212°F)	---
Falling temperature	From ON to OFF above 91°C (196°F)	--
	ON: Less than 0.5 Ω	
	OFF: More than 1 MΩ	
Water temperature sensor internal resistance	47 ~ 57 Ω @80° (176°F) 26 ~ 30 Ω @100°C(212°F)	-

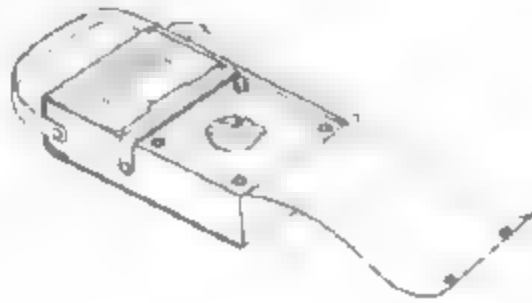
(I). Italian Model (SA). South African Model

Special Tools

Coil Tester 57001-1242



Hand Tester 57001-983



Sealant

Kawasaki Bond (Silicone Sealant): 56019-120



15-8 ELECTRICAL SYSTEM

Precautions

There are numbers of important precautions that are musts when servicing electrical system. Learn and observe all the rules below

- Do not reverse the battery lead connections. This will burn out the diodes in the electrical parts.
- Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- To prevent damage to electrical parts, do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or the engine is running.
- Do not use a meter illumination bulb rated for other than the voltage or wattage specified in the wiring diagram, as the meter or gauge panel could be warped by excessive heat radiated from the bulb.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was caused by some other item or items, they too must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the part is cold (at room temperature).
- Electrical Connectors

Female Connectors

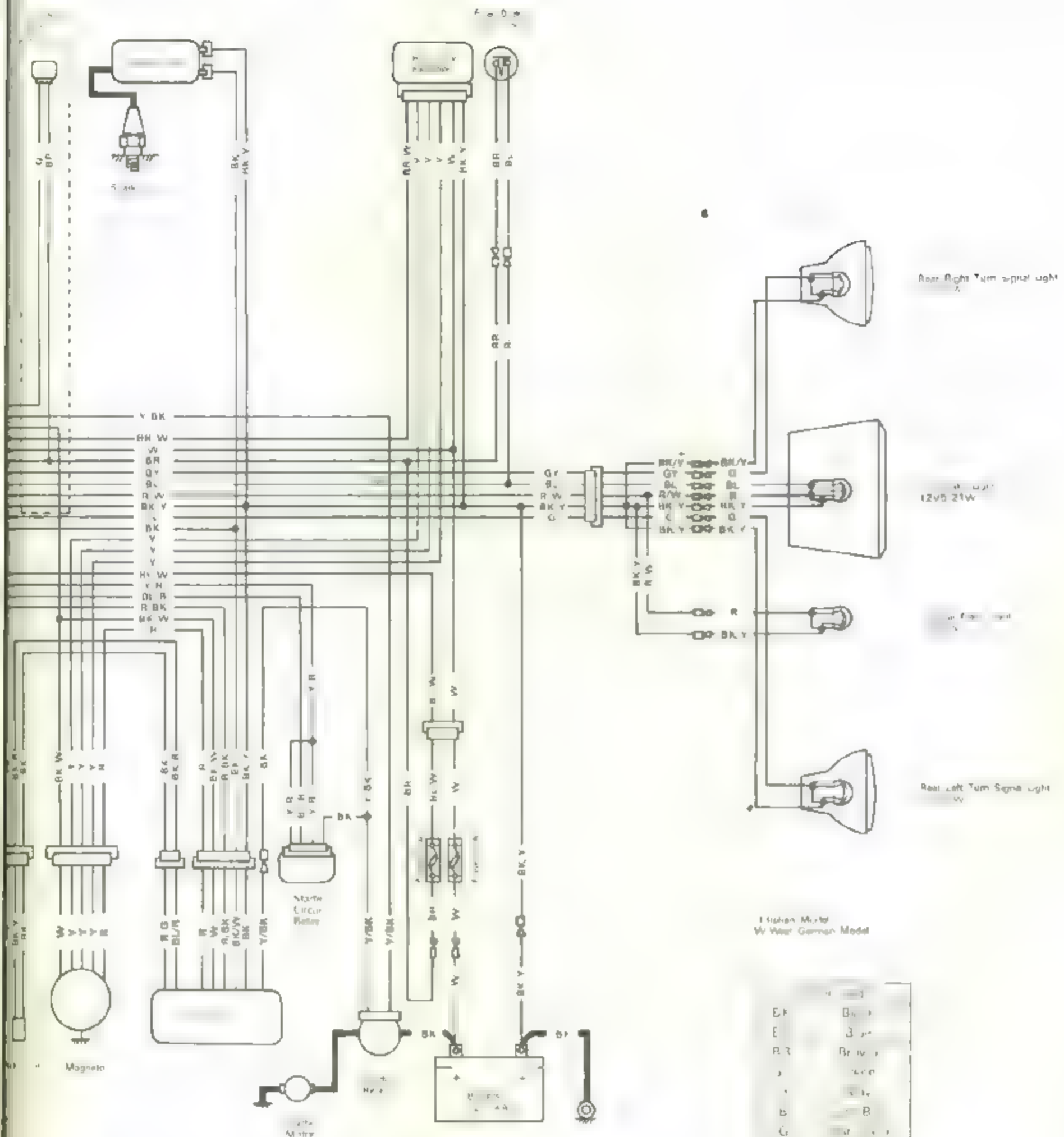


Male Connectors



Color Codes

BK	Black
BL	Blue
BR	Brown
CH	Chocolate
DG	Dark green
G	Green
GY	Gray
LB	Light blue
LG	Light green
O	Orange
P	Pink
PU	Purple
R	Red
W	White
Y	Yellow

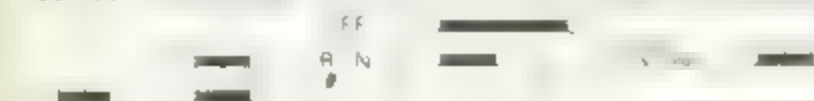


1150A Model
W. Weir German Model

EF	BK/Y
E	3
ER	BK/Y
	W/Y
	W/Y
B	B
G	W/Y
	W/Y
	W/Y
R	Red
W	W
Y	Y

RIGHT HANDLEBAR SWITCH CONNECTIONS

Headlight Switch Engine Stop Switch Starter Button



9R051 1145A 1149A 1150A

Wiring Diagram (KL650-B1/KL500-B1)

Right Hand Side View

Front Right Turn Signal
12V21W

Ignition
Switch

Meter Light
12V3 4W

Meter Light
12V3 4W

Meter Light
12V3W

Neutral Indicator
Light 12V3 4W

High Beam
Indicator Light
2V3 4W

Turn Signal
Indicator Light
12V3 4W

Water Temperature
Gauge

Tachometer

Headlight
1xV80 55W

City Light
2V4W

Front Left Turn Signal
12V21W

Left Hand Side View

Passing Button

LEFT HANDLEBAR SWITCH CONNECTIONS

Color	Turn Signal Switch	Horn Button	Passing Button
HI	R BK P	R Y	Color R BK BR
LO			

IGNITION SWITCH CONNECTIONS

Color	BK Y	BK W	W	BR	R	R W
HI						
LO						

15-10 ELECTRICAL SYSTEM

Wiring Diagram (KL650-B2) (US and Canada)

Front Right Turn Signal Light
12V21W

Ignition Switch

Motor Light
2V3 4W

Motor Light
2V3 4W

Motor Light
2V3 4W

Motor Light
2V3 4W

Motor Light
2V3 4W

Motor Light
2V3 4W

Motor Light
2V3 4W

Motor Light
2V3 4W

Front Left Turn Signal Light
12V21W

Front Left Turn Signal Light
12V21W

Right Handbar Switches

Front Brake Light

Engine Stop






Starter Switch

Fuel Valve

Fan Relay

Clutch

LEFT HANDLEBAR SWITCH CONNECTIONS

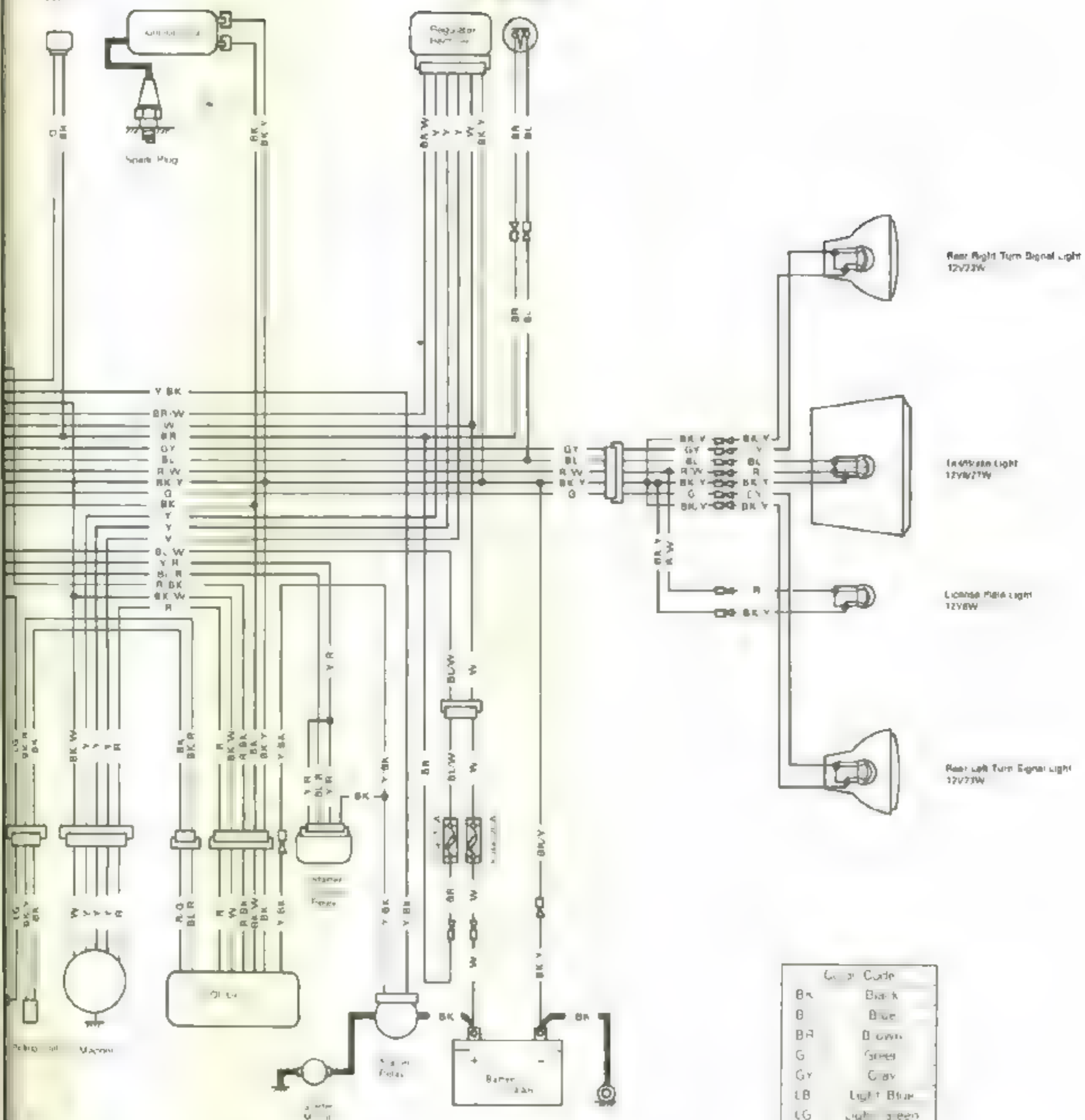
Dimmer Switch				Turn Signal Switch				Horn Button			
Color	R	BK	BL/Y	R/Y	Color	GY	O	G	Color	BK/Y	BK
Hi	+			+	R				ON/Push		
LO	+				L						

IGNITION SWITCH CONNECTIONS

Color	BK/Y	BK/W	W	BR	R	R/W
ON	○	○	○	○	○	○
OFF	○	○	○	○	○	○
LOCK	○	○	○	○	○	○
P	○	○	○	○	○	○

Turn Signal
Relay

Rear Brake
Light Switch



Electrical Wiring

Inspection

- Visually inspect the wiring for signs of burning, fraying, etc.
- ★ If any wiring is poor, replace the damaged wiring.
- Pull each connector apart and inspect it for corrosion, dirt, and damage.
- ★ If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.
- Check the wiring for continuity.
- Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
- Connect an ohmmeter between the ends of the leads.
- Set the meter to the $\times 1 \Omega$ range, and read the meter.
- ★ If the meter does not read 0Ω , the lead is defective. Replace the lead or the wiring harness if necessary.

Battery

Precautions:

Following a few simple rules will greatly extend the life of the battery.

- When the level of the electrolyte in the battery is low, add only distilled water to each cell, until the level is at the upper level line marked on the outside of the battery. Ordinary tap water is not a substitute for distilled water and will shorten the life of the battery.
- Never add sulphuric acid solution to the battery. This will make the electrolyte solution too strong and will ruin the battery within a very short time.
- Avoid quick charging the battery. A quick charge will damage the battery plates.
- Never let a good battery stand for more than 30 days without giving it a supplemental charge, and never let a discharged battery stand without charging it. If a battery stands for any length of time, it slowly self-discharges. Once it is discharged, the plates sulphate (turn white), and the battery will no longer take a charge.
- Keep the battery well-charged during cold weather so that the electrolyte does not freeze and crack open the battery. The more discharged the battery becomes, the more easily it freezes.
- Always keep the battery vent hose free of obstruction, and make sure it does not get pinched, crimped, or melted shut by contact with the hot muffler. If battery gases cannot escape through this hose, they will explode the battery.
- DONT INSTALL THE BATTERY BACKWARDS. The negative side is grounded.

Electrolyte:

Level Inspection

- Visually check the electrolyte level in the battery.



A. Upper Level

B. Lower Level

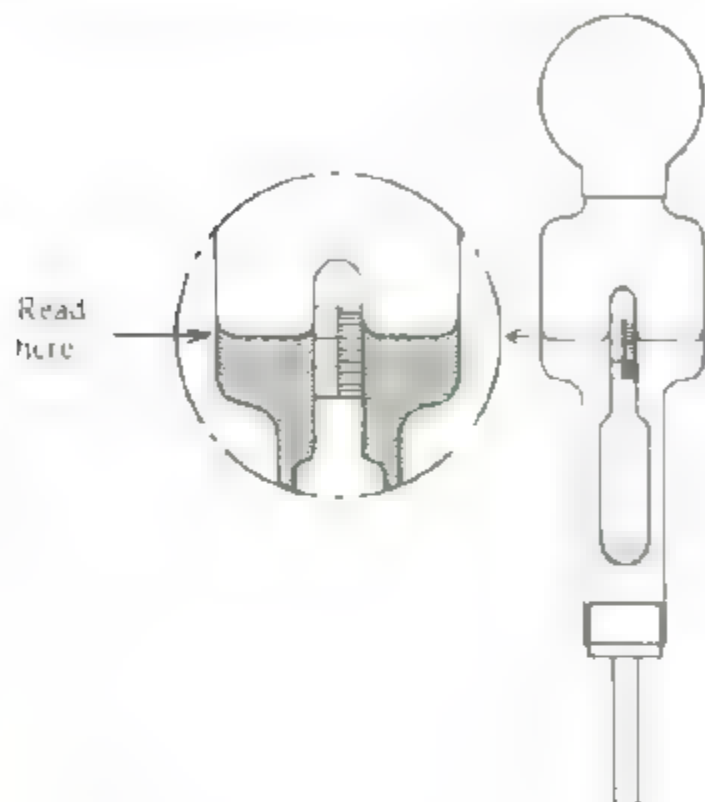
- ★ If the level line of electrolyte in any cell is below the lower level line on the battery case, add distilled water only to that cell.

15-12 ELECTRICAL SYSTEM

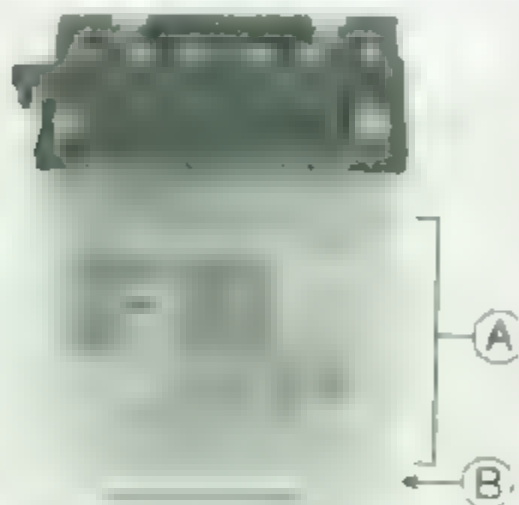
Charging:

Battery Condition

- Before charging, check battery condition by testing the specific gravity of the electrolyte in each cell
- Draw a little fluid from the cell with a hydrometer
- Read the level of the electrolyte on the floating scale. This is the specific gravity of the electrolyte



- Look for sediment and white sulfation inside the cells on the bottom of the plates



A. Sulfation here

B. Sediment here

- See the Battery Troubleshooting Guide in Test Charging
- ★ If the specific gravity is below 1.200 the battery needs to be charged.

NOTE

- The specific gravity of the electrolyte varies with changes in temperature, so the specific gravity reading must be corrected for the temperature of the electrolyte

- *Celsius* Add 0.007 points to reading for each 10°C above 20°C or subtract 0.007 points for each 10°C below 20°C
- *Fahrenheit* Add 0.004 points to reading for each 10°F above 68°F or subtract 0.004 points for each 10°F below 68°F

- ★ If the specific gravity of any of the cells is more than 0.050 away from any other reading, the battery will probably not accept a charge. It is generally best to replace a battery in this condition
- ★ If the specific gravity of all the cells is 1.280 or more the battery is fully charged

Initial Charging

Before being placed in service, a new battery must be given an initial charging

- Cut off the sealed end of the battery vent hose and remove the filler caps
- Fill each cell to the upper level line on the battery case with fresh electrolyte at a temperature of 30°C (86°F) or less. Let the battery stand for about 30 minutes before charging

NOTE

- If the electrolyte level drops, add electrolyte to the upper level line before charging
- Leaving the caps off the cells, connect the battery to a charger, set the charging rate at 1/10 the battery capacity, and charge it for 10 hours. For example, if the battery is rated at 14Ah, the charging rate would be 1.4A

CAUTION

- If the battery is not given a full initial charging, it will discharge in a few weeks and will not recover fully even with supplemental charging

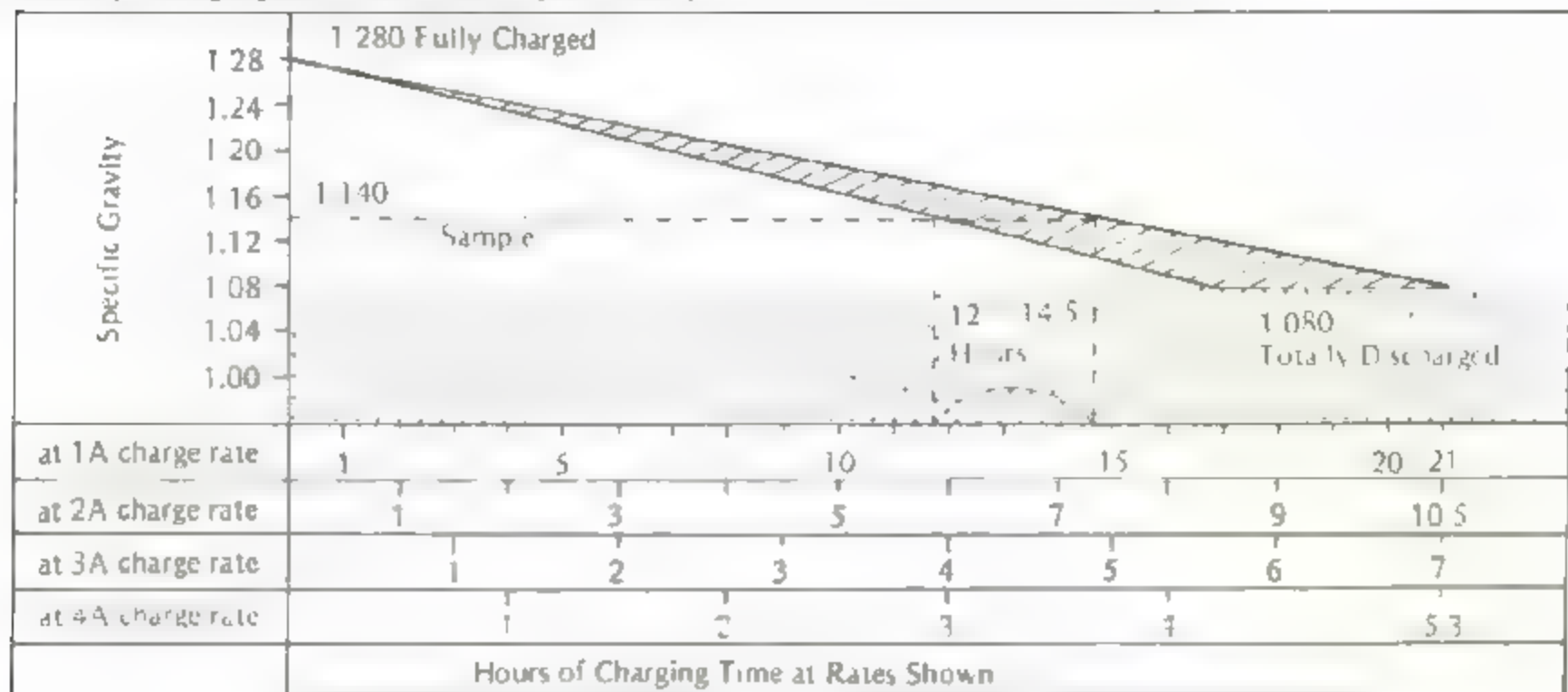
WARNING

- Keep the battery away from sparks and open flames during charging since the battery gives off an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases.

CAUTION

- Do not use a high rate battery charger, as is typically employed at automotive service stations, unless the charger rate can be reduced to the level required. Charging the battery at a rate higher than specified may ruin the battery. Charging at a high rate causes excess heat which can warp the plates and cause

Battery Charging Rate/Time Table (12V 14Ah)



internal shorting. Higher-than-normal charging rates also cause the plates to shed active material. Deposits will accumulate, and can cause internal shorting.

- If the temperature of the electrolyte rises above 45°C (115°F) during charging, reduce the charging rate to lower the temperature, and increase charging time proportionately.

- Turn the charger off, then disconnect it from the battery.
- Check battery voltage. Battery voltage should be 12 ~ 13 V.
- Check the specific gravity of each cell with a hydrometer (see Battery Condition).
- ★ If the voltmeter or hydrometer readings are below those specified, additional charging is necessary before the battery can be installed.

Ordinary Charging

- Remove the battery from the motorcycle.

CAUTION

- Always remove the battery from the motorcycle for charging. If the battery is charged while still installed, battery electrolyte may spill and corrode the frame or other parts of the motorcycle.

- Clean off the battery using a baking soda and water solution.
- Mix one heaping tablespoon of baking soda in one cup of water.
- Be careful not to get any of the cleaning solution in the battery.
- The terminals must be especially clean.
- If any of the cells are low, fill them to the LOWER level line with distilled water only. The electrolyte will expand during charging, and the level will rise.

- Connect a charger to the battery BEFORE plugging it in or turning it on.

WARNING

- Keep the battery away from sparks and open flames during charging, since the battery gives off an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases.

- Set the charge rate and time according to the battery condition previously determined (see Battery Condition), using the table.

CAUTION

- Do not use a high rate battery charger, as is typically employed at automotive service stations, unless the charger rate can be reduced to the level required. Charging the battery at a rate higher than specified may ruin the battery. Charging at a high rate causes excess heat which can warp the plates and cause internal shorting. Higher-than-normal charging rates also cause the plates to shed active material. Deposits will accumulate, and can cause internal shorting.

- If the temperature of the electrolyte rises above 45°C (115°F) during charging, reduce the charging rate to lower the temperature, and increase charging time proportionately.

- Turn the charger off or unplug it, then disconnect it from the battery.
- Check battery condition (see Battery Condition).
- ★ If the battery condition indicates that it is not fully charged, additional charging time is necessary.

15-14 ELECTRICAL SYSTEM

Test Charging

- If the battery is suspected of being defective, sulfated, or unable to take a charge, consult the table
- To test charge a battery, perform the ordinary charging procedure and monitor the battery voltage and other signs as mentioned below
- ★ If the battery voltage suddenly jumps to over 13 V just after the start of charging, the plates are probably sulfated. A good battery will rise to 12 V immediately and then gradually go up to 12.5 or 13 V in about 30 min to an hour after the start of charging
- ★ If one cell produces no gas bubbles or has a very low specific gravity, it is probably shorted
- ★ If there does not appear to be enough sediment in a cell to short the plates, but that cell has a very low specific gravity after the battery is fully charged, the trouble may be that there is not enough acid in that one cell. In this case only, sulfuric acid solution may be added to correct the specific gravity.
- ★ If a fully charged battery not in use loses its charge after 2 to 7 days, or if the specific gravity drops markedly, the battery is defective. The self discharge rate of a good battery is only about 1% per day

Flywheel Magneto

Flywheel Removal/Installation Notes

- See the Magneto Flywheel Removal in the Engine Right Side/Left Side chapter

Stator Removal

- Remove the magneto cover (see the Magneto Cover Removal in the Engine Right Side/Left Side chapter)
- Remove the holding plate
- Unfit the pickup coil lead and stator coil lead grommets out of the notch of cover
- Unscrew the mounting bolts, and take off the stator



A. Holding Plate
B. Grommets

C. Mounting Bolts
D. Stator

Stator Installation Notes

- Fit the stator coil lead grommet first, and the pickup coil lead grommet into the notch of cover securely
- Route the magneto leads in accordance with the Wire Routing in the General Information chapter

Battery Troubleshooting Guide

	Good Battery	Suspect Battery	Action
Plates	(+) chocolate color (-) gray	white (sulphated), + plates broken or corroded	Replace
Sediment	none, or small amount	sediment up to plates, causing short	Replace
Voltage	above 12 V	below 12 V	Test charge
Electrolyte Level	above plates	below top of plates	Fill and test charge
Specific Gravity	above 1.200 in all cells; no two cells more than 0.020 different	below 1.100, or difference of more than 0.020 between two cells	Test charge

Inspection

There are three types of magneto problems: short, open (wire burned out), or loss in flywheel magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in flywheel magnetism, which may be caused by dropping or hitting the flywheel or just by aging, will result in low output. Therefore, in inspecting the flywheel magneto, first measure the output, next, inspect the coils and the flywheel (see Charging System Ignition System).

Charging System**Magneto Output Voltage Inspection**

- Turn off the ignition switch.
- Remove :
 - Side Covers
 - Seat
- Disconnect the regulator/rectifier connector.
- Connect the multimeter as shown in table 1.

Table 1 Magneto Output Voltage

Meter Range	Connections		Reading @4,000 rpm
	Meter (+) to	Meter (-) to	
250 V AC	One yellow lead (6 pin connector)	Another yellow lead (6 pin connector)	Not less than 34 V

- Start the engine.
- Run it at the rpm given in table 1.
- Note the voltage readings (total 3 measurements).
- ★ If the output voltage shows the value in table 1, the magneto is working properly. A much lower reading than that given in the table indicates that the magneto is defective. Check the charging coil.

Charging Coil Inspection

- Turn off the ignition switch.
- Remove :
 - Side Covers
 - Seat
 - Fuel Tank
- Disconnect the magneto lead connector (6 pin).

**A Magneto Lead Connector**

- Zero the ohmmeter, and connect it as shown in table 2.

15-16 ELECTRICAL SYSTEM

Table 2 Charging Coil Resistance

Meter Range	Connections		Reading
	Meter (+) to	Meter (-) to	
x 1 Ω	One yellow lead (6 pin connector)	Another yellow lead (6 pin connector)	0.3 ~ 1.0 Ω

● Note the resistance reading

★ If there is more resistance than shown in table 2, the stator may have an open lead, the lead between the stator and the connector may be open, or the connections may be bad. Check the stator and the leads, and fix or replace any damaged parts.

★ If there is much less resistance than shown in table 2, the stator may have an internal short, or the lead between the stator and the connector may be grounded. Check the stator and the lead, and fix or replace any damaged parts.

● Using the highest resistance range of the ohmmeter, measure the resistance between each of the yellow leads and chassis ground.

★ Any meter reading less than infinity (∞) indicates a short, necessitating stator replacement.

★ If the charging coils have normal resistance, but the output voltage check showed the magneto to be defective, then the flywheel magnets have probably weakened, and the flywheel must be replaced.

Charging Voltage (Regulator/Rectifier Output Voltage) Inspection

- Remove Side Covers
- Check the battery condition (see Battery)

NOTE

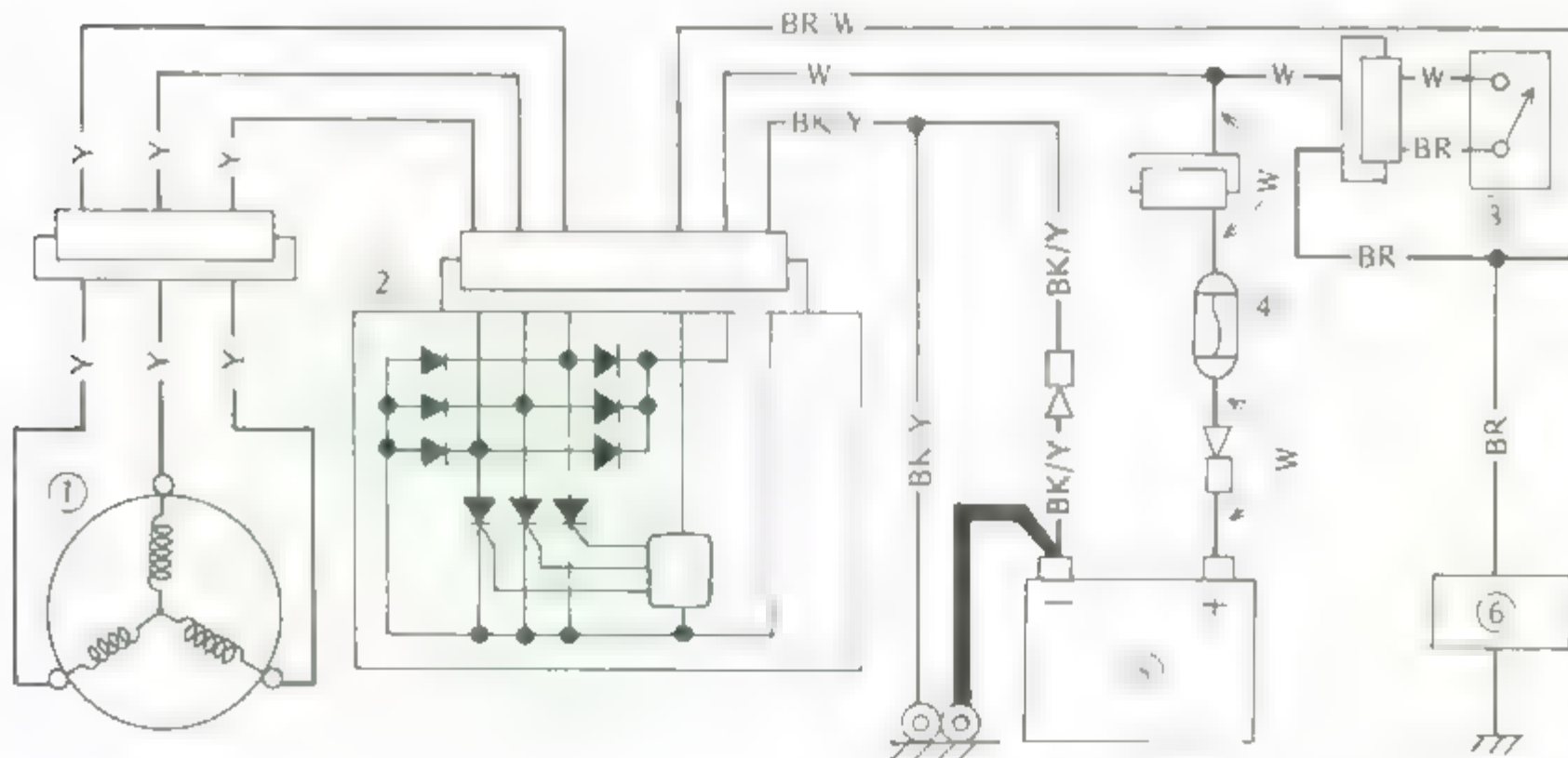
○ The battery must be fully charged

- Warm up the engine to obtain actual magneto and regulator/rectifier operating conditions
- Stop the engine, and connect the multimeter as shown in table 3

Table 3 Charging Voltage

Meter Range	Connections		Reading
	Meter (+) to	Meter (-) to	
25 V DC	Battery (+) Lead connector (White)	Battery (-) Lead connector (Black/Yellow)	Battery ~ 15 V

- Start the engine, and note the voltage readings at various engine speeds with the headlight turned on and then turned off. The readings should show nearly battery voltage when the engine speed is low, and, as engine speed rises, the readings should also rise. But they must stay under the specified maximum voltage.
- Turn off the ignition switch to stop the engine, and disconnect the multimeter.



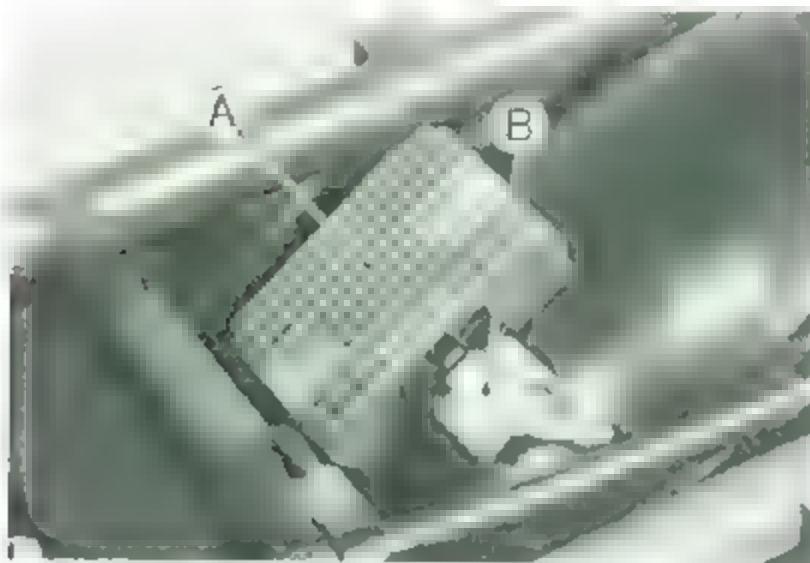
- | | |
|-----------------------------|------------------|
| 1. Charging Coils (Magneto) | 4. 20A Main Fuse |
| 2. Regulator/Rectifier | 5. Battery |
| 3. Ignition Switch | 6. Loads |

- ★ If the charging voltage stays between the values given in table 3, the charging system is considered to be working normally.
- ★ If the charging voltage is much higher than the values specified in the table 3, the regulator/rectifier is defective. Check the regulator/rectifier.
- ★ If the charging voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the magneto output is insufficient. Check the magneto and the regulator/rectifier.

Regulator/Rectifier Inspection

Rectifier Circuit Check

- Turn off the ignition switch
- Remove
 - Side Covers
 - Seat
- Disconnect the regulator/rectifier connector



A Regulator/Rectifier

B Connector

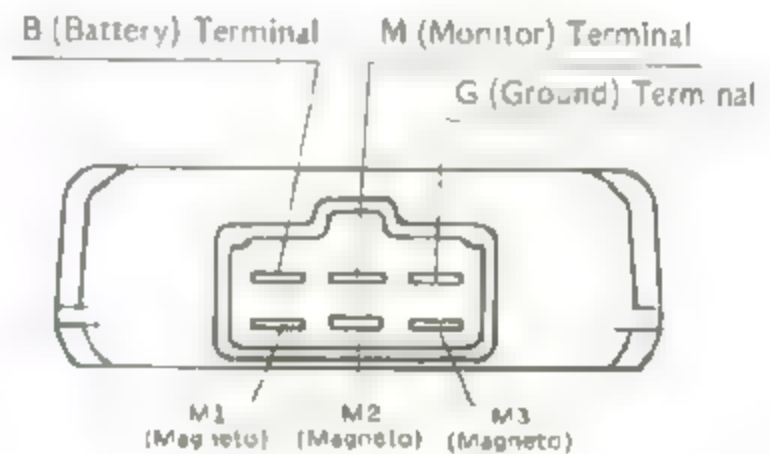
- Zero the ohmmeter, and connect it to the regulator/rectifier terminals
- Check the resistance between the terminals following the table
- ★ The resistance should be low in one direction and more than ten times as much in the other direction. If any two leads are low or high in both directions, the rectifier is defective and must be replaced

NOTE

- The actual meter reading varies with the meter used and the individual rectifier, but, generally speaking the lower reading should be from zero to the first 1/2 of the scale

Rectifier Circuit Check

No	Connections		Reading	Meter Range
	Meter () to	Meter () to		
1	M1			
2	M2	B	∞	
3	M3			
4	M1			
5	M2	G		$\times 10 \Omega$
6	M3		0 ~	or
7		M1	1/2 scale	$\times 100 \Omega$
8	B	M2		
9		M3		
10		M1		
11	G	M2	∞	
12		M3		



Regulator Circuit Check:

- Before checking, prepare the test circuit shown. You will need
 - Test light: Bulb rated 12 V and 3 ~ 6 W
 - Battery: 6 V and 12 V battery
 - Lead: 5 leads

CAUTION

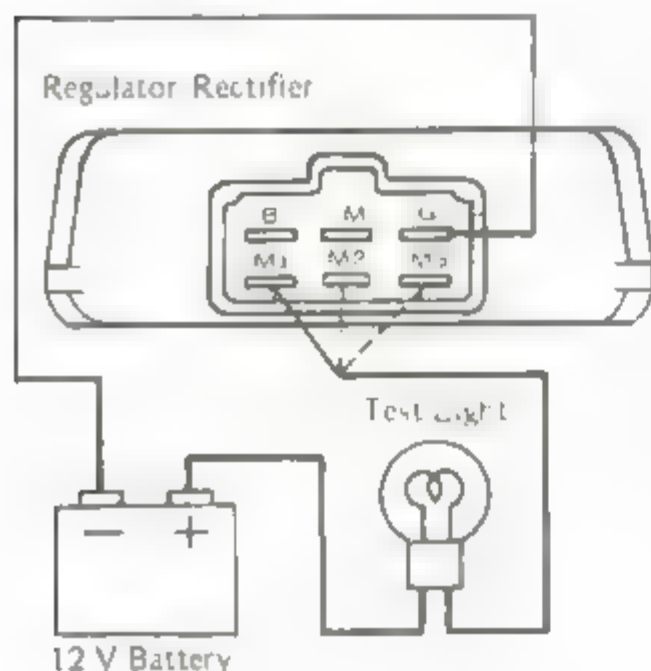
- The test light works as an indicator and also a current limiter to protect the regulator/rectifier from excessive current. Do not use an ammeter instead of a test light.

- Turn off the ignition switch
- Remove
 - Side Covers
 - Seat
- Disconnect the regulator/rectifier connector
- Unscrew the mounting bolt, and remove the regulator/rectifier from the frame
- Check to be sure the rectifier circuit is normal before continuing

15-18 ELECTRICAL SYSTEM

Regulator Circuit Test-1st Step:

- Connect the test light and the 12 V battery to the regulator/rectifier as shown
- Check M1, M2, and M3 terminal respectively



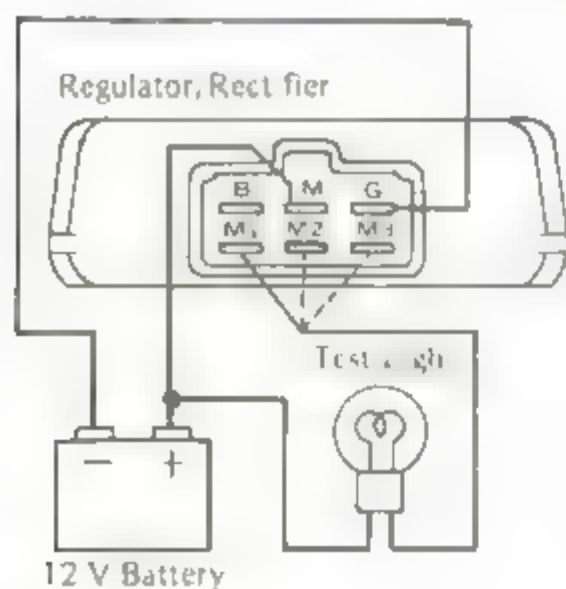
CAUTION

○ The test light limits the current flow through the regulator/rectifier. Do not use an ammeter or multi meter in its place

- ★ If the test light turns on, the regulator/rectifier is defective. Replace it.
- ★ If the test light does not turn on, continue the test

Regulator Circuit Test-2nd Step

- Connect the test light and the 12 V battery in the manner specified in the "Regulator Circuit Test-1st step"
- Apply 12 V to the voltage detection terminal
- Check M1, M2, and M3 terminal respectively



- ★ If the test light turns on, the regulator/rectifier is defective. Replace it.
- ★ If the test light does not turn on, continue the test

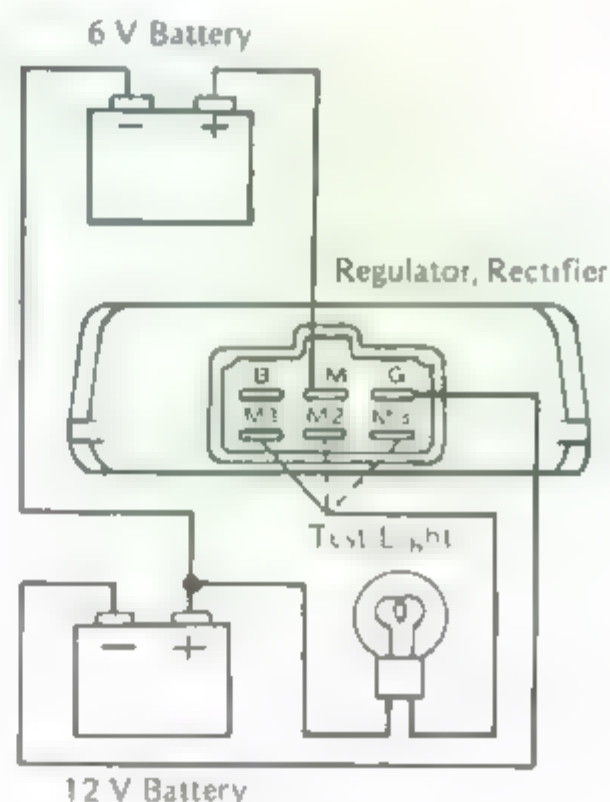
Regulator Circuit Test-3rd Step

- Connect the test light and the 12 V battery in the same manner as specified in the "Regulator Circuit Test 1st Step."
- Momentarily apply 18 V to the voltage monitoring terminal by adding a 6 V battery
- Check M1, M2, and M3 terminals respectively

CAUTION

○ Do not apply more than 18 V to the regulator/rectifier and do not leave the 18 V applied for more than a few seconds, or the unit will be damaged

- ★ If the test light did not light when the 18 V was applied momentarily to the voltage monitoring terminal, the regulator/rectifier is defective. Replace it.
- ★ If the regulator/rectifier passes all of the tests described, it may still be defective. If the charging system still does not work properly after checking all of the components and the battery, test the regulator/rectifier by replacing it with a known good unit



Ignition System

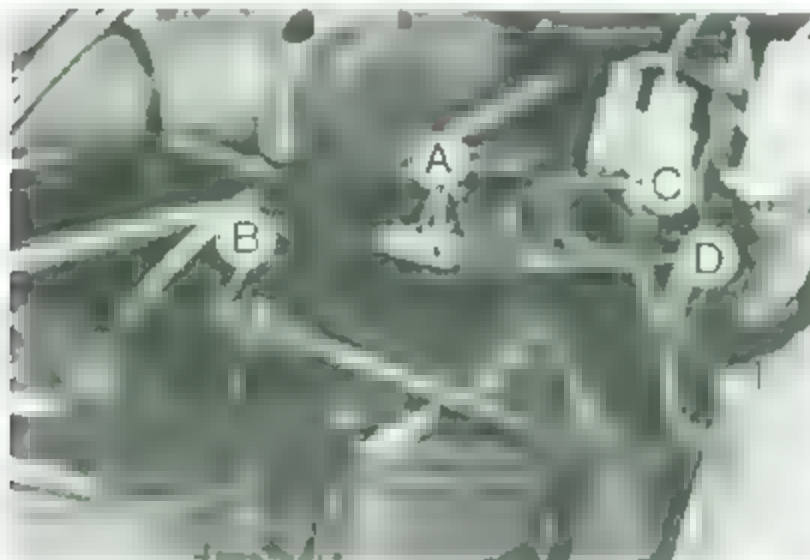
Safety Instruction:

WARNING

- The ignition system produces extremely high voltage. Do not touch the spark plug, high tension coil, or spark plug lead while the engine is running, or you could receive a severe electrical shock.

Ignition Coil Removal

- Remove :
 - Side Covers
 - Seat
 - Fuel Tank
- Disconnect the ignition coil primary lead connectors
- Pull the plug cap off the spark plug
- Unscrew the mounting bolt, and remove the ignition coil

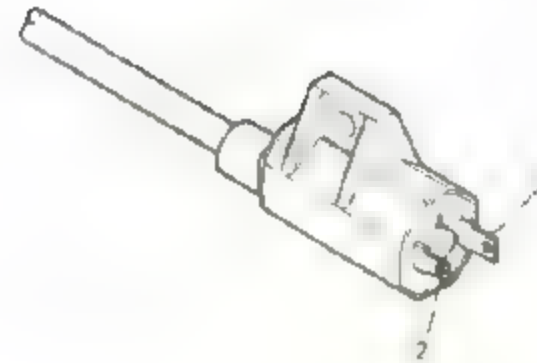


A. Primary Lead Connectors
B. Plug Cap

C. Mounting Bolt
D. Ignition Coil

Ignition Coil Installation Note

- Connect the primary leads to the ignition coil terminals as shown in the figure



1. (+) Terminal ← BK 2. (-) Terminal ← BK/Y

Ignition Coil Inspection

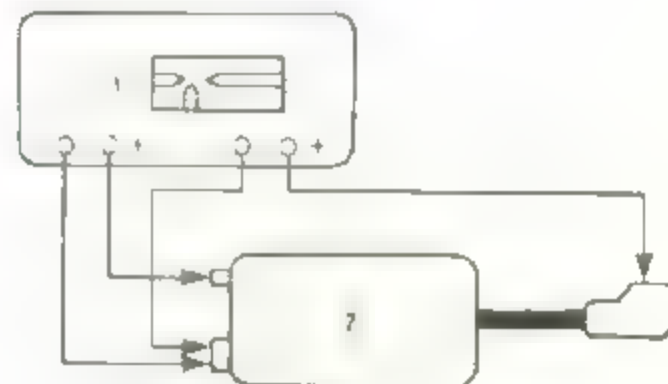
Measuring arcing distance

The most accurate test for determining the condition of the ignition coil is made by measuring arcing distance with the Coil Tester (special tool) for the 3 needle method.

NOTE

- Since a tester other than the Coil Tester may produce a different arcing distance, the Coil Tester is recommended for reliable results.

- Remove the ignition coil
- Connect the ignition coil (with the spark plug cap left installed on the spark plug lead) to the tester, and measure the arcing distance.



1. Coil Tester 57001-1242 2. Ignition Coil

WARNING

- To avoid extremely high voltage shocks, do not touch the coil or lead.

- ★ If the distance reading is less than the specified value, the ignition coil or spark plug cap is defective.

3 Needle Arcing Distance

7mm or more

15-20 ELECTRICAL SYSTEM

- To determine which part is defective, measure the arcing distance again with the spark plug cap removed from the ignition coil lead.
- ★ If the arcing distance is subnormal as before, the trouble is with the ignition coil itself. If the arcing distance is now normal, the trouble is with the spark plug cap.

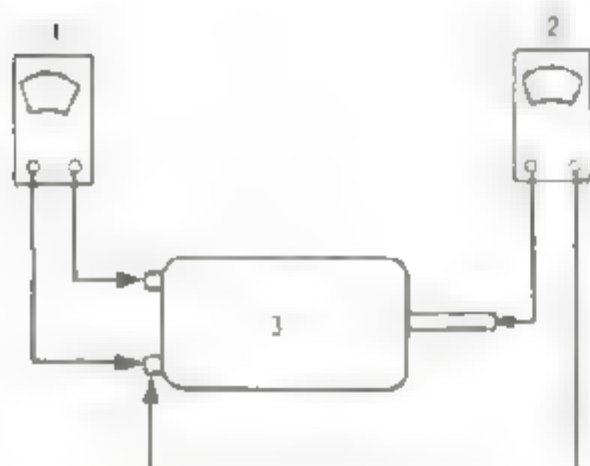
Measuring coil resistance.

If the arcing tester is not available, the coil can be checked for a broken or badly shorted winding with an ohmmeter. However, an ohmmeter cannot detect layer shorts and shorts resulting from insulation breakdown under high voltage.

- Disconnect the primary leads from the coil terminals.
- Measure the primary winding resistance.
- Connect an ohmmeter between the coil terminals.
- Set the meter to the $\times 1 \Omega$ range, and read the meter.
- Measure the secondary winding resistance.
- Pull the spark plug cap off the lead.
- Connect an ohmmeter between the spark plug lead and the black/yellow lead terminal.
- Set the meter to the $\times 1 \text{ k}\Omega$ range, and read the meter.
- ★ If the meter does not read as specified, replace the coil.

Winding Resistance

Primary windings:	0.15 ~ 0.21 Ω
Secondary windings:	3.8 ~ 6.8 $\text{k}\Omega$



1. Measure primary winding resistance
2. Measure secondary winding resistance
3. Ignition Coil

- ★ If the meter reads as specified, the ignition coil windings are probably good. However, if the ignition system still does not perform as it should after all other components have been checked, test replace the coil with one known to be good.
- Check the spark plug lead for visible damage.
- ★ If the spark plug lead is damaged, replace the coil.

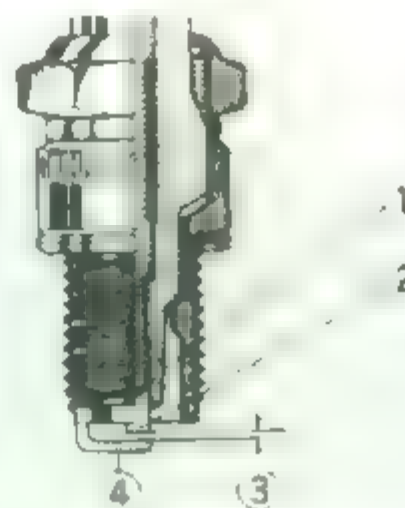
Spark Plug Cleaning and Inspection

- Remove the spark plug, and visually inspect.
- Clean the spark plug, preferably in a sandblasting device, and then clean off any abrasive particles. The plug may also be cleaned using a high flashpoint solvent and a wire brush or other suitable tool.
- ★ If the spark plug electrodes are corroded or damaged or if the insulator is cracked, replace the plug. Use the standard spark plug or its equivalent.

Spark Plug Gap Inspection

- Measure the gap with a wire-type thickness gauge.
- ★ If the gap is incorrect, carefully bend the side electrode with a suitable tool to obtain the correct gap.

Spark Plug Gap
0.8 ~ 0.9 mm



- | | |
|--------------------|------------------|
| 1 Insulator | 3. Plug Gap |
| 2 Center Electrode | 4 Side Electrode |

CDI Unit Inspection

- Remove
 - Side Covers
 - Seat
 - Fuel Tank
 - Coolant Reservoir Tank Cover
- Disconnect the CDI unit lead connectors.
- Take out the CDI unit.

CDI Unit Internal Resistance

Unit: k Ω

Meter Positive (+) Lead Connection								
Lead	W	R	BL/R	R/G	BK/W	BK	Y/BK	
W	-	∞	∞	∞	∞	∞	∞	∞
R	10 ~ 55	-	5 ~ 35	5 ~ 25	∞	5 ~ 25	20 ~ 90	
BL R	4 ~ 20	4 ~ 20		1 ~ 6	∞	1 ~ 6	10 ~ 55	
R G	2 ~ 10	2 ~ 10	1 ~ 6	-	∞	0	10 ~ 50	
BK W	∞	∞	∞	∞	-	∞	∞	
BK	2 ~ 10	2 ~ 10	1 ~ 6	0	∞	-	10 ~ 50	
Y/BK	15 ~ 80	15 ~ 80	10 ~ 55	0 ~ 50	∞	10 ~ 50	-	

* Meter Negative (-) Lead Connection

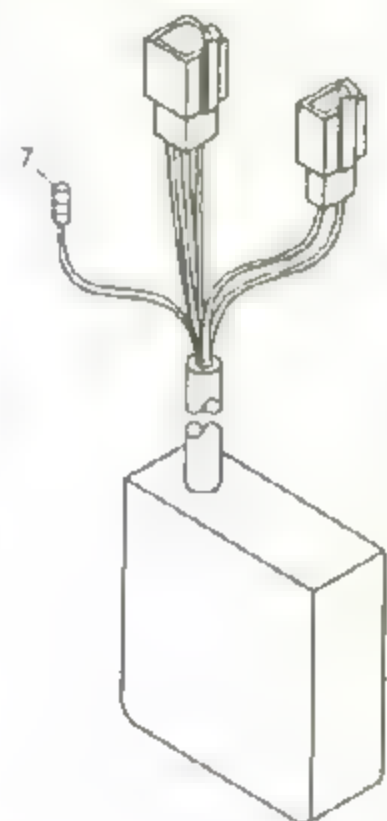


A Connectors

B CDI Unit

CAUTION

- Use only Kawasaki Hand Tester (special tool: 57001-983) for this test. A tester other than the Kawasaki Hand Tester may show different readings.
- Do not use a megger or a meter with a large capacity battery, or the CDI unit will be damaged.



1. White Lead Terminal
2. Red Lead Terminal
3. Blue/Red Lead Terminal
4. Red/Green Lead Terminal
5. Black/White Lead Terminal
6. Black Lead Terminal
7. Yellow/Black Lead Terminal

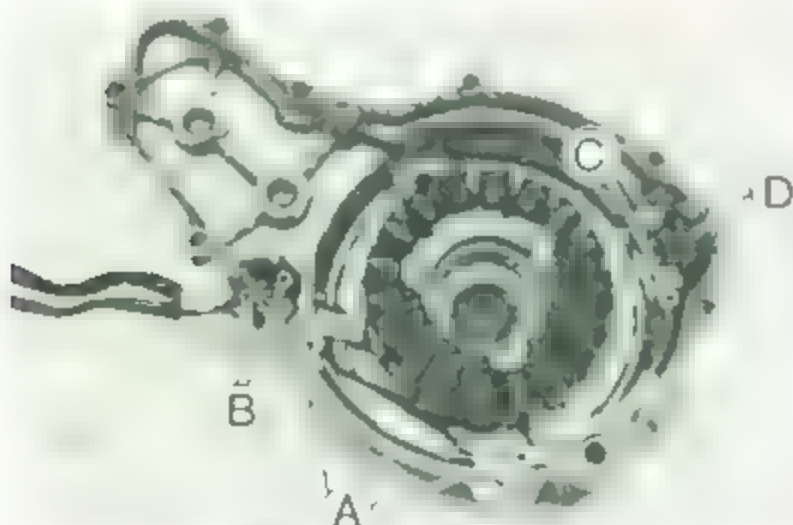
- Set the Kawasaki Hand Tester (special tool: 57001-983) to the x1 k Ω range, connect the Tester to the terminals in the CDI unit lead connectors, and check the internal resistance following the table.

★ If the readings do not correspond to the table, replace the CDI unit.

15-22 ELECTRICAL SYSTEM

Pickup Coil Removal

- Remove the magneto cover (see the Magneto Cover Removal in the Engine Right Side/Left Side chapter)
- Remove the holding plates for the pickup coil lead.
- Unfit the pickup coil lead grommets out of the notch of cover
- Unscrew the mounting screw, and take off the pickup coil



A. Holding Plates
B. Grommets
C. Mounting Screw
D. Pickup Coil

Pickup Coil Installation Notes

- Route the pickup coil lead with fitting into the groove between the rib and wall of cover
- After fitting the stator coil lead grommet fit the pickup coil lead grommet into the notch of cover securely
- Route the magneto leads in accordance with the Wire Routing in the General Information chapter

Pickup Coil Inspection

- Remove
Side Covers
Seat
Fuel Tank
- Disconnect the magneto (pickup coil) lead connector (3 pin)



A. Magneto Lead Connector (3 pin)

- Zero the ohmmeter, and connect it to the pickup coil leads
- ★ If there is more resistance than the specified value the coil has a broken wire and must be replaced. Much less than this resistance means the coil is shorted and must be replaced.

Pickup Coil Resistance

100 ~ 150 Ω (BK - BK/Y)

- Using the highest resistance range of the ohmmeter, measure the resistance between the pickup coil leads and chassis ground
- ★ Any meter reading less than infinity (∞) indicates a short, necessitating replacement of the pickup coil assembly

Exciter Coil Inspection

- Remove
Side Covers
Seat
Fuel Tank
- Disconnect the magneto lead connector (6 pin).
- Zero the ohmmeter, and connect it as shown in the table

Exciter Coil Resistance

Meter Range	Connections		Reading
	Meter (+) to	Meter (-) to	
x 10 Ω	Red lead (6 pin connector)	White lead (6 pin connector)	100 ~ 200 Ω



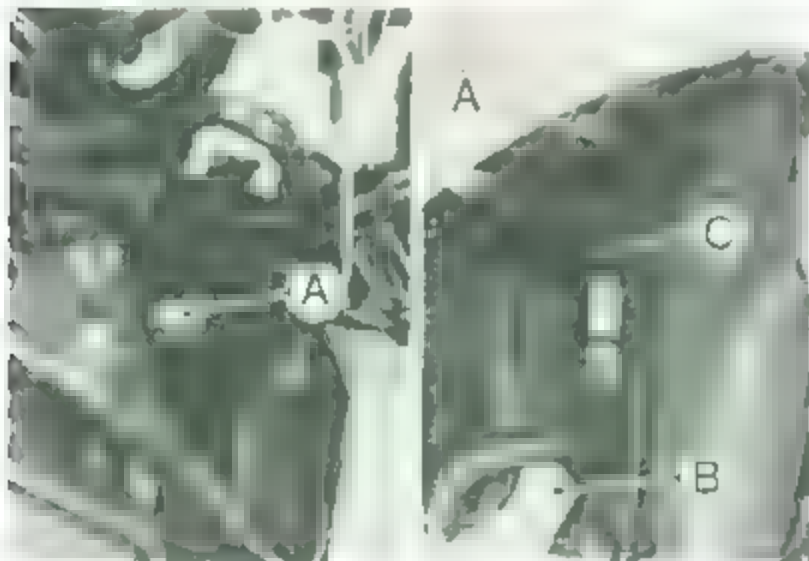
A. Magneto Lead Connector (6 pin)

- ★ If there is more resistance than shown in the table the stator has a broken wire, the leads between the stator and the connector are open, or the connections are bad. Check the stator and the leads, and fix or replace the damaged parts
- ★ If there is much less resistance than shown in the table, the stator is shorted, or the leads between the stator and the connector is grounded. Check the stator and the leads, and fix or replace the damaged parts

- Using the highest resistance range of the ohmmeter, measure the resistance between each of the red or white leads and chassis ground.
- ★ Any meter reading less than infinity (∞) indicates a short to ground. Replace the stator.

Diode Inspection

- Remove
 - Side Covers
 - Seat
 - Fuel Tank
 - Coolant Reservoir Tank Cover
- Remove the bracket mounting bolts and the reservoir tank upper left mounting bolt
- While pulling the bracket to the right side, disconnect the diode assembly

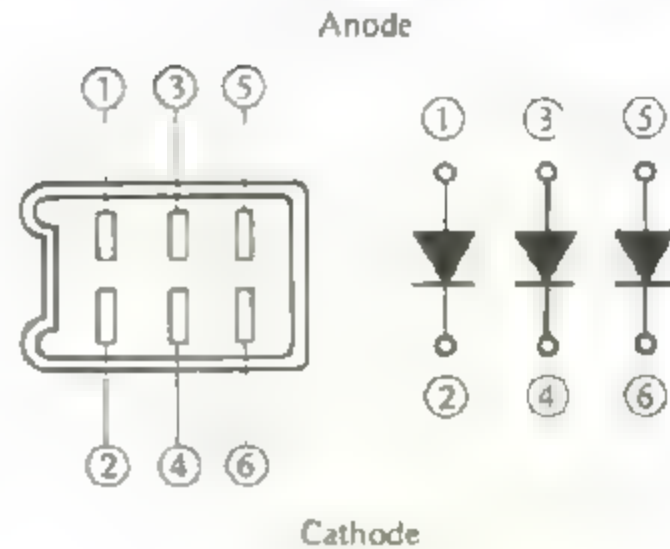


- A Bracket Mounting Bolts
- B Reservoir Tank Upper Left Mounting Bolt
- C Diode Assembly

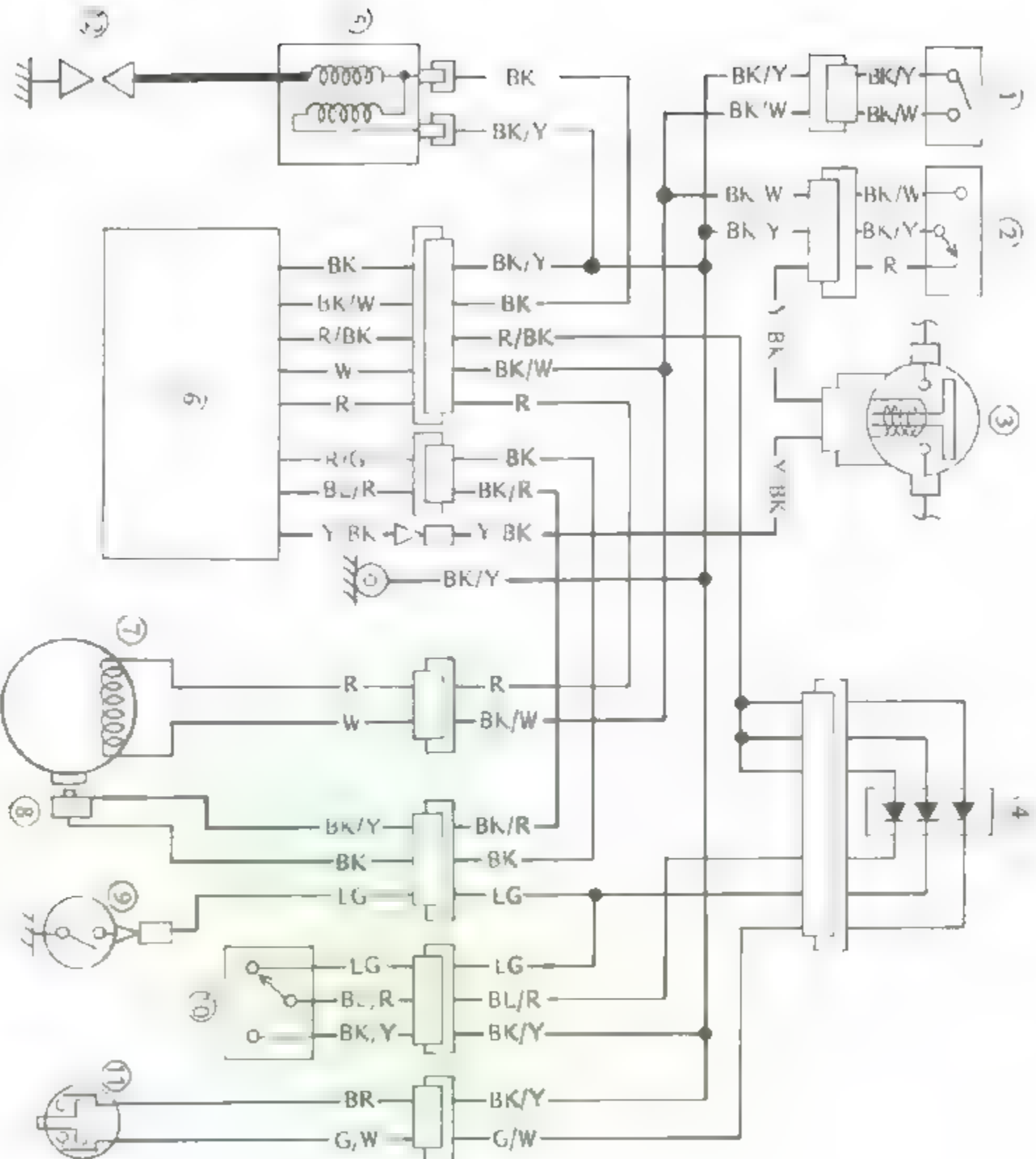
- Zero the ohmmeter and connect it to each diode's terminals to check the resistance in both directions.
- ★ The resistance should be low in one direction and more than ten times as much in the other direction. If any diode shows low or high resistance in both directions, the diode is defective and the diode assembly must be replaced.

NOTE

- The actual meter reading varies with the meter used and the individual diode, but, generally speaking, the lower reading should be from zero to the first 1/2 of the scale.



15-24 ELECTRICAL SYSTEM



1. Ignition Switch
2. Engine Stop Switch
3. Starter Relay
4. Diodes

5. Ignition Coil
6. CDI Unit
7. Exciter Coil (Magneto)
8. Pickup Coil

9. Neutral Switch
10. Starter Lockout Switch
11. Side Stand Switch
12. Spark Plug

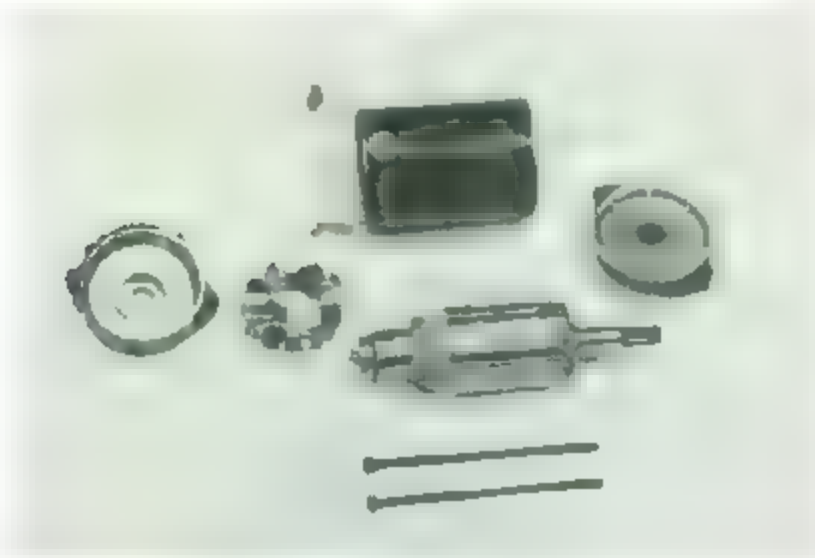
Electric Starter System

Starter Motor Removal/Installation Note

- See the Starter Mechanism in the Engine Right Side/Left Side chapter

Starter Motor Disassembly

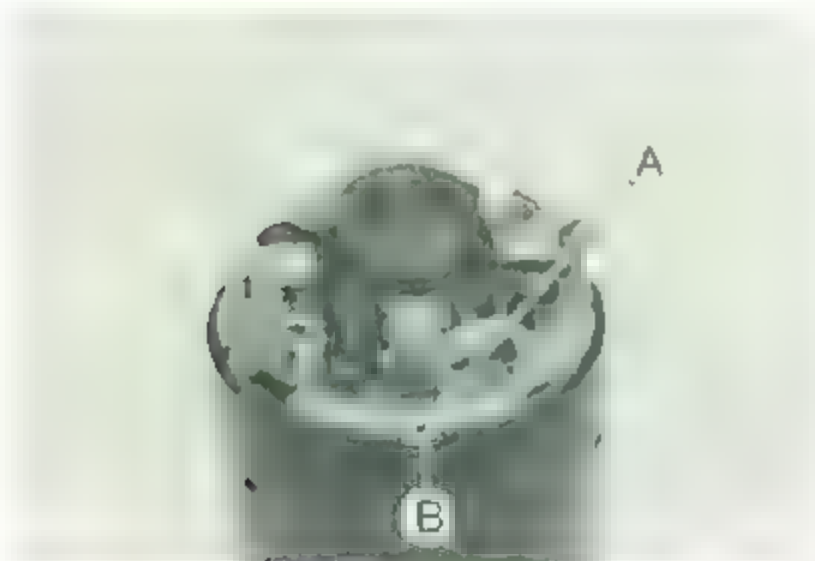
- Unscrew the retaining screws, and pull off both end covers
- Take the armature out of the yoke housing
- Remove the brush plate assembly from the housing



- Remove the nut and remove the terminal bolt, and then remove the positive brush assembly with the plastic holder

Starter Motor Assembly Notes

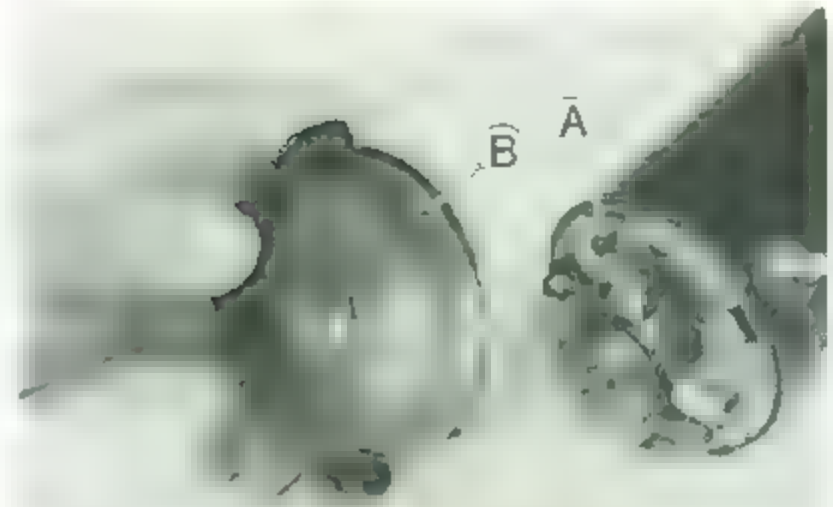
- Push the brush plate into place with its tab fitting in the yoke housing notch.



A. Tab

B. Notch

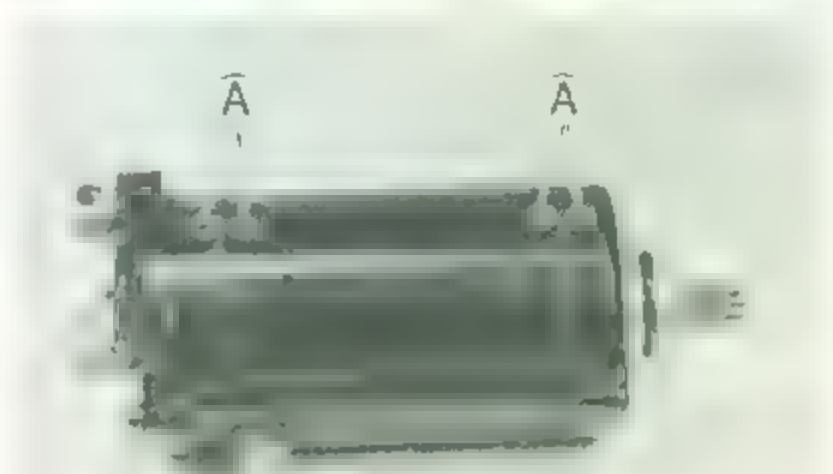
- Install the brush end cover so that the long vertical tab on the brush plate aligns with the key slot in the cover



A. Long Tab

B. Key Slot

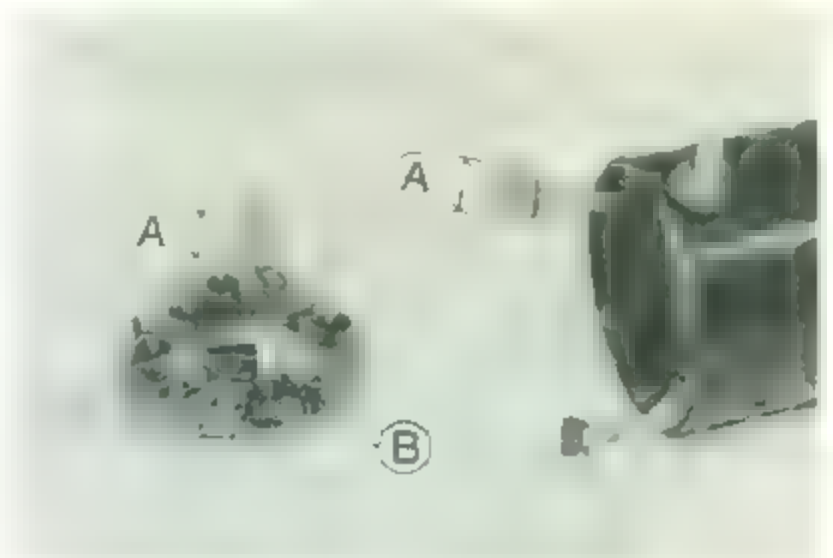
- As a further check, these marks should align on the outside of the starter



A. Align marks

Starter Motor Brush Length

- Measure the length of each brush
- ★ If any is worn down to the service limit, replace all brushes



A. Measure brush length. B. Brush Spring

Brush Length

Standard:	12.0 ~ 12.5 mm
Service Limit:	6 mm

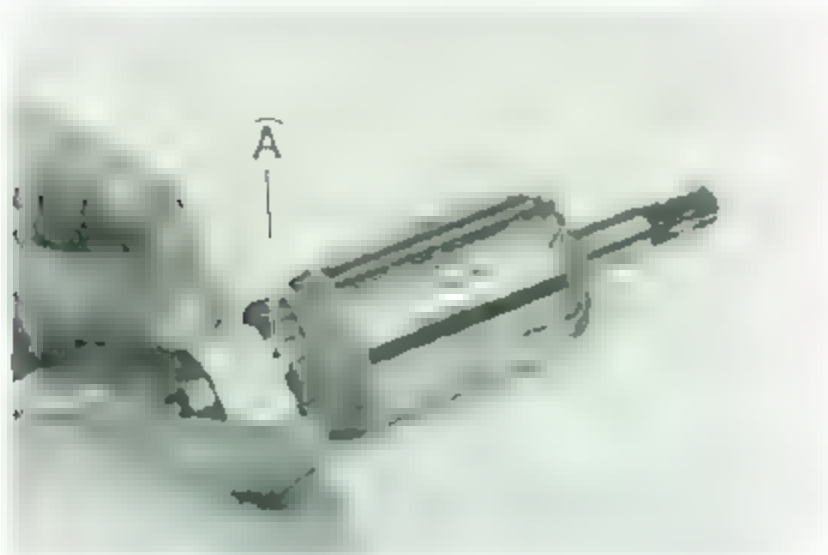
15-26 ELECTRICAL SYSTEM

Brush Spring Inspection

- Check that the brush springs are in place and snap the brushes firmly into place
- ★ If not, reinstall or replace the spring.

Commutator Cleaning and Inspection

- Smooth the commutator surface if necessary with fine emery cloth, and clean out the grooves



A. Commutator

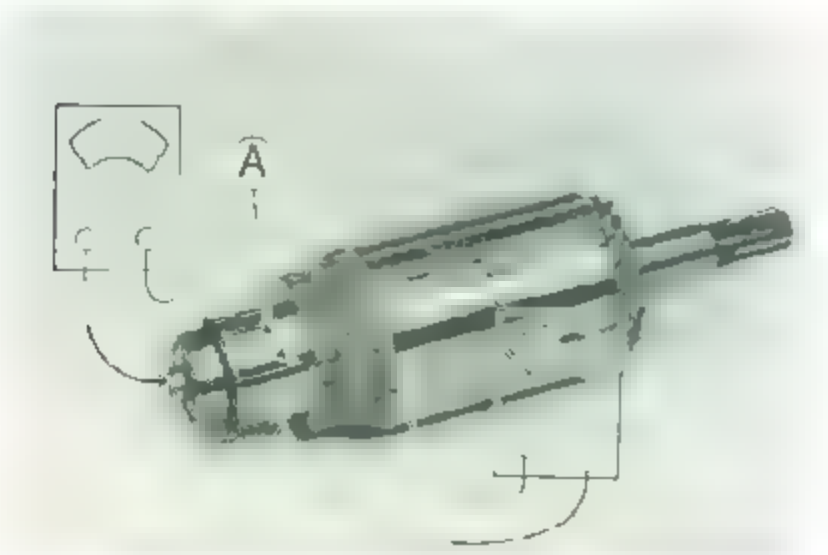
- Measure the diameter of the commutator
- ★ Replace the starter motor with a new one if the commutator diameter is less than the service limit

Commutator Diameter

Standard:	28 mm
Service Limit:	27 mm

Armature Inspection

- Using the x 1 Ω ohmmeter range, measure the resistance between any two commutator segments.
- ★ If there is a high resistance or no reading (∞) between any two segments, a winding is open and the starter motor must be replaced



A. Segment

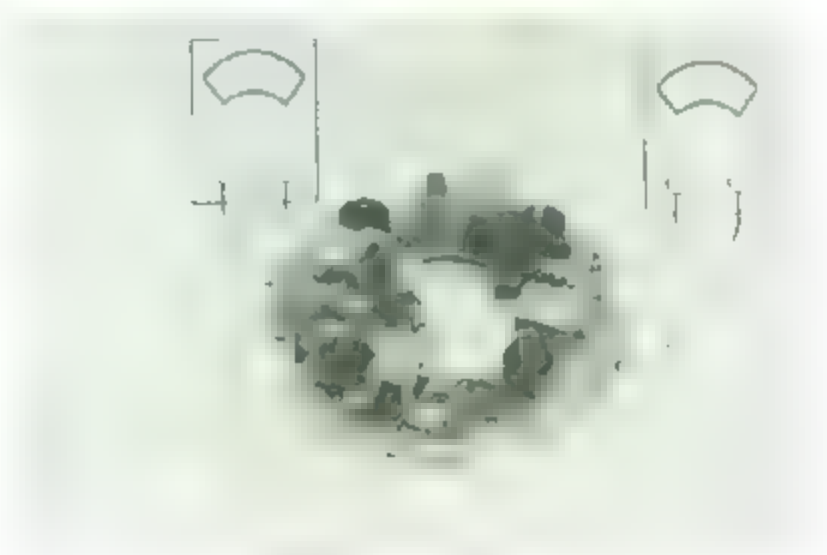
B. Shaft

- Using the highest ohmmeter range, measure the resistance between the commutator and the shaft
- ★ If there is any reading at all, the armature has a short and the starter motor must be replaced

Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with an ohmmeter. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.

Brush Plate Inspection

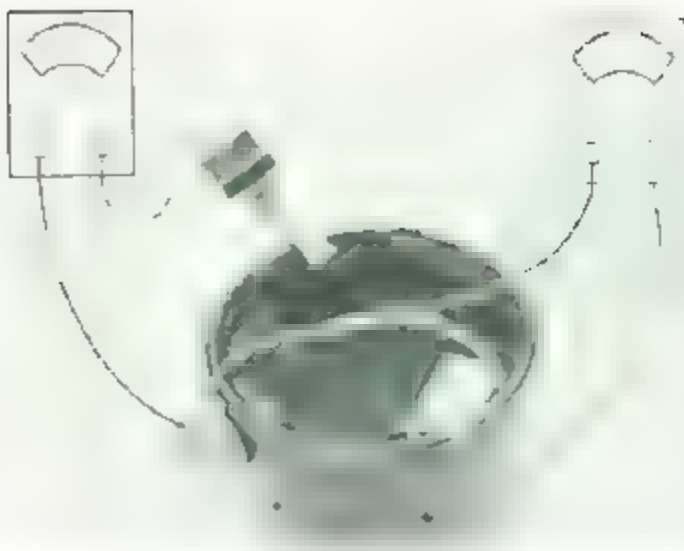
- Using the x 1 Ω ohmmeter range, measure the resistance between the negative brushes and the plate
- ★ If there is not close to zero ohms, the brush plate must be replaced



- Using the highest ohmmeter range, measure the resistance between the metal plate and the positive brush holders
- ★ If there is any reading at all, the brush holder has a short and the brush plate must be replaced

Positive Brush Assembly Inspection

- Using the x 1 Ω ohmmeter range, measure the resistance between the positive brush and the terminal bolt
- ★ If there is a high resistance or no reading (∞), a lead is open and the brush assembly must be replaced



- Using the highest ohmmeter range, measure the resistance between the terminal bolt and the pole housing
- ★ If there is any reading at all, the insulation is faulty and the positive brush assembly must be replaced

Starter Relay Inspection

- Remove the side stand switch cover
- Disconnect the starter motor lead and battery positive (+) lead from the starter relay

CAUTION

- The battery positive (+) lead with the rubber cap is connected directly to the battery positive (+) terminal even when the ignition switch is off, so take care not to short the removed lead to chassis ground

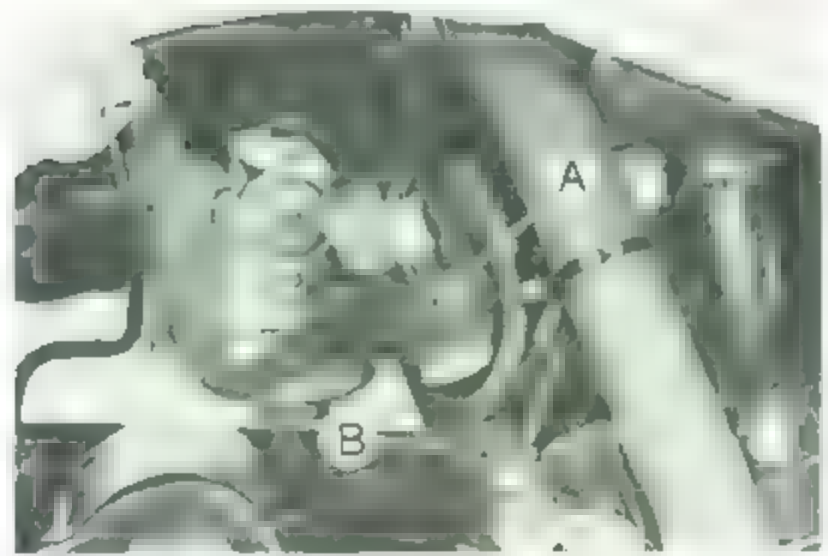
- Using the $\times 1 \Omega$ ohmmeter range, measure the resistance across the relay terminals.
- ★ If the relay clicks but the meter does not read zero, the relay is defective and must be replaced. If the relay does not click at all, the relay is defective and must be replaced.
- ★ If the relay makes a single clicking sound and the meter reads zero, the relay is good. The trouble is in the starter motor or the motor power supply wires.

Switch Position

- Ignition switch ON
- Engine stop switch RUN
- Starter button ON
- Neutral switch ON (transmission is in neutral)

Meter Connection

- | | |
|----------------|--|
| Location | Starter relay terminals
(leads disconnected) |
| Meter range | $\times 1 \Omega$ |
| Meter Reading: | 0 Ω and relay clicks when
starter button is pushed |



A Starter Relay

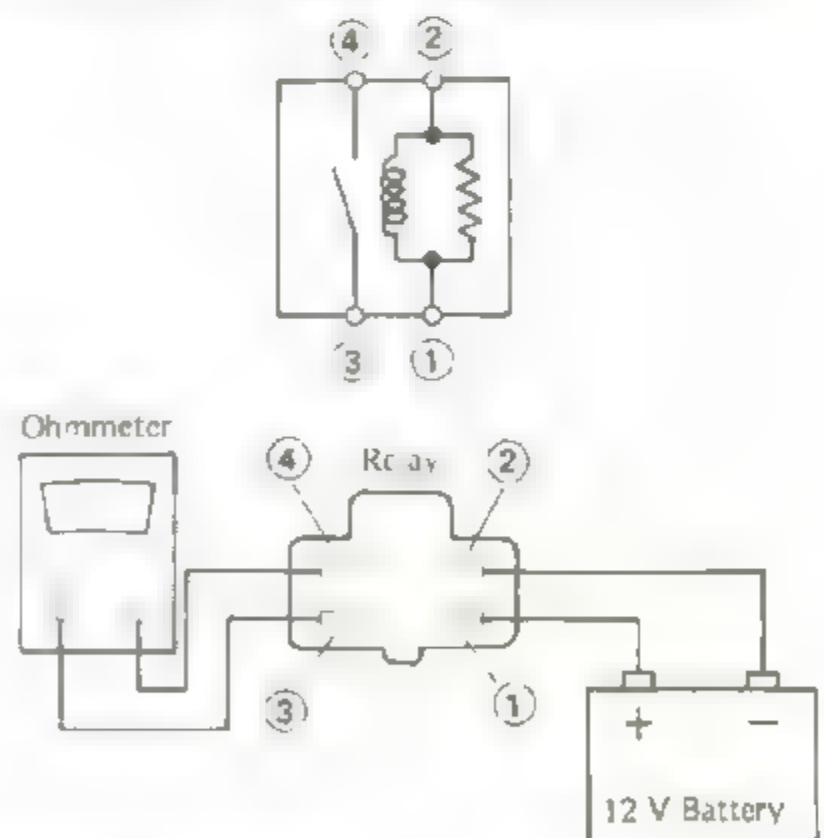
B Starter Circuit Relay

Starter Circuit Relay Inspection

- Remove the side stand switch cover
- Remove the relay
- Connect the ohmmeter and one 12 volt battery to the relay as shown
- ★ If the relay does not work as specified, the relay is defective

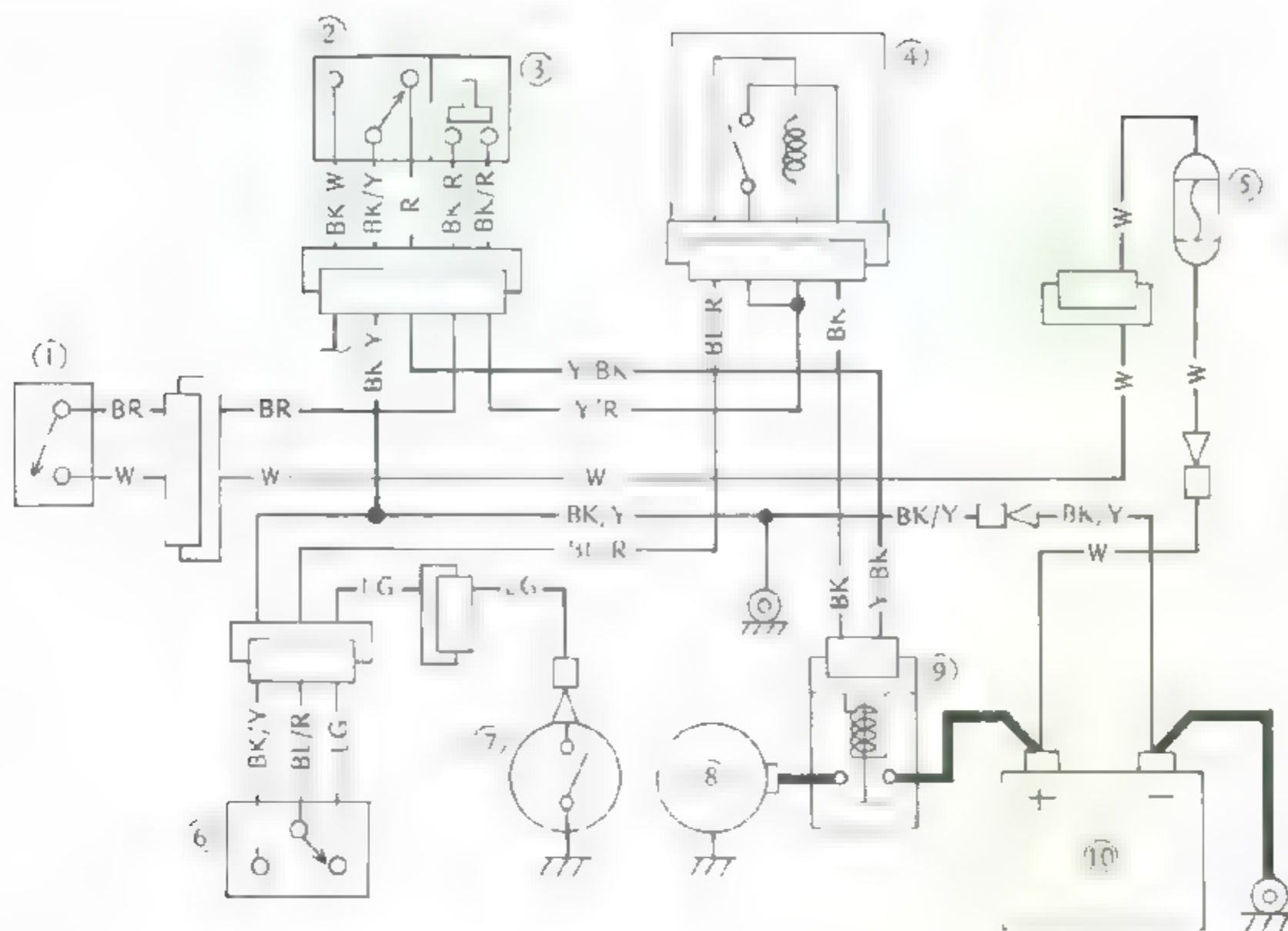
Testing Relay

Meter range	$\times 1 \Omega$ range
Connection	
1 \leftarrow Meter \rightarrow 2	: 65 ~ 85 Ω
3 \leftarrow Meter \rightarrow 4	: 0 Ω with battery connected
3 \leftarrow Meter \rightarrow 4	: $\infty \Omega$ with battery disconnected



- 1 and 2 Relay Coil Terminals
- 3 and 4 Relay Switch Terminal

15-28 ELECTRICAL SYSTEM



1. Ignition Switch
2. Engine Stop Switch
3. Starter Button
4. Starter Circuit Relay

- 5 20A Main Fuse
- 6 Starter Lockout Switch
- 7 Neutral Switch
- 8 Starter Motor

- 9 Starter Relay
10 Battery

Lighting System

The headlight beam is adjustable both horizontally and vertically. Headlight aiming must be correctly adjusted both for your safety as well as that of oncoming drivers. In most areas it is illegal to ride with an improperly adjusted headlight.

Headlight Beam Horizontal Adjustment

- Turn the adjusting screw on the headlight rim in or out until the beam points straight ahead. Turning the adjusting screw clockwise makes the headlight beam point to the left.



A. Adjusting Screw

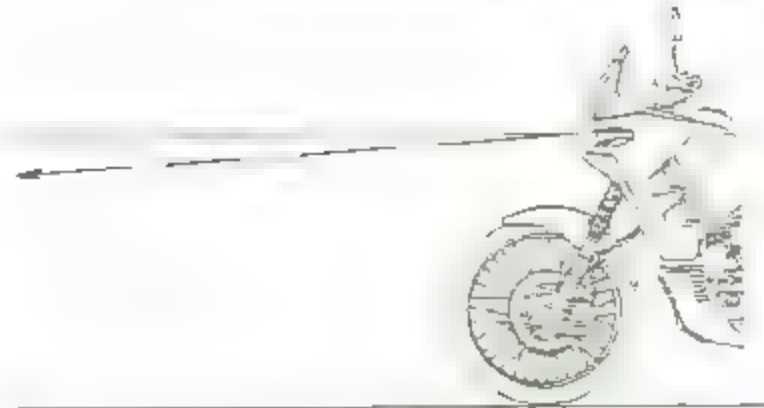
Headlight Beam Vertical Adjustment

The headlight beam is adjustable vertically. If adjusted too low, neither low nor high beam will illuminate the road far enough ahead. If adjusted too high, the high beam will fail to illuminate the road close ahead and the low beam will blind oncoming drivers.

- Turn the adjusting knob on the headlight rim to the right or left until the beam points straight ahead. Turning the adjusting knob clockwise makes the headlight beam point to the lower.

NOTE

- On high beam, the brightest point should be slightly below horizontal with the motorcycle on its wheels and the rider seated. Adjust the headlight to the proper angle according to local regulations.

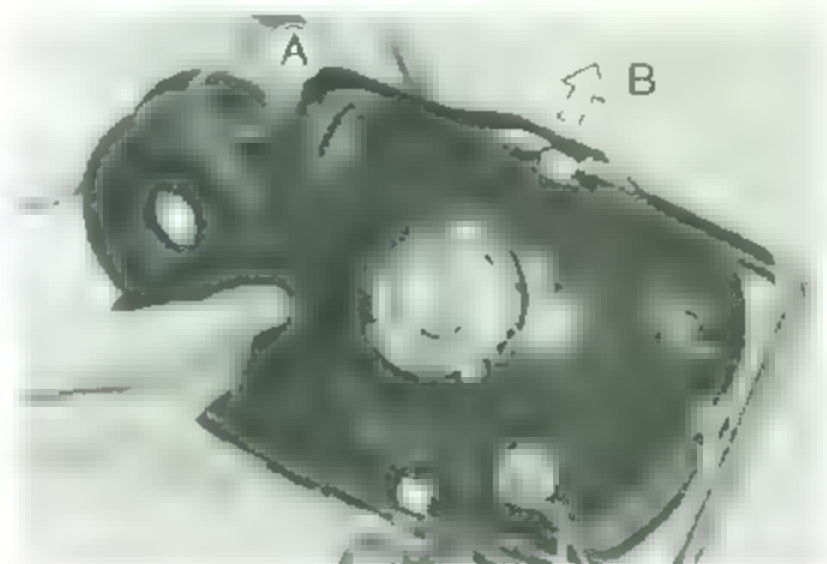


A. Adjusting Knob

Headlight Bulb Replacement Notes

CAUTION

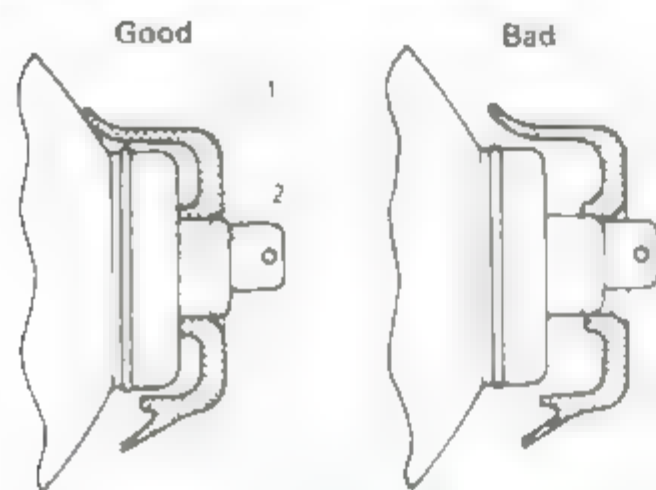
- When handling the quartz-halogen bulbs, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode.
- Install the dust cover so that the "TOP" mark point up and the cover fits onto the bulb firmly as shown.



A. Top Mark

B. Up

15-30 ELECTRICAL SYSTEM



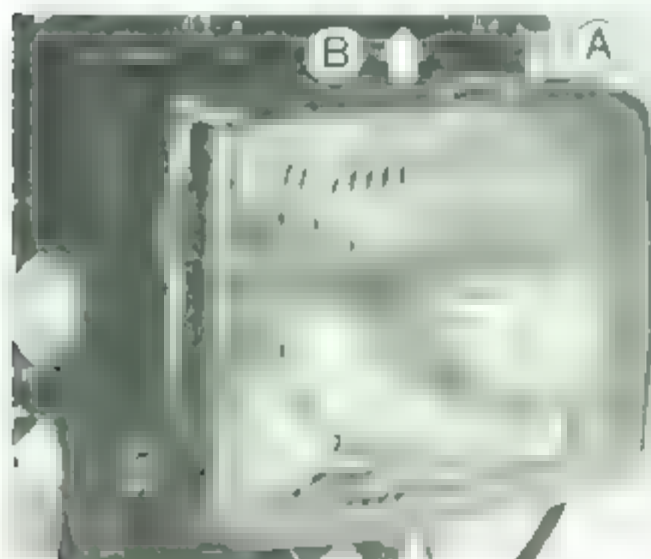
1 Dust Cover

2 Headlight Bulb

- Check the headlight aim after installation

Headlight Unit Removal/Installation Note

- Install the headlight unit so that the "TOP" mark on the lens points up



A. Top Mark

B Up

Tail/Brake Light Bulb Replacement Note

- Insert the new bulb by aligning the pins with the grooves in the walls of the socket so that the pin closest to the bulb base is to the upper right



A. Pin Closest to Base

Tail/Brake Light Lens

Removal/Installation Note

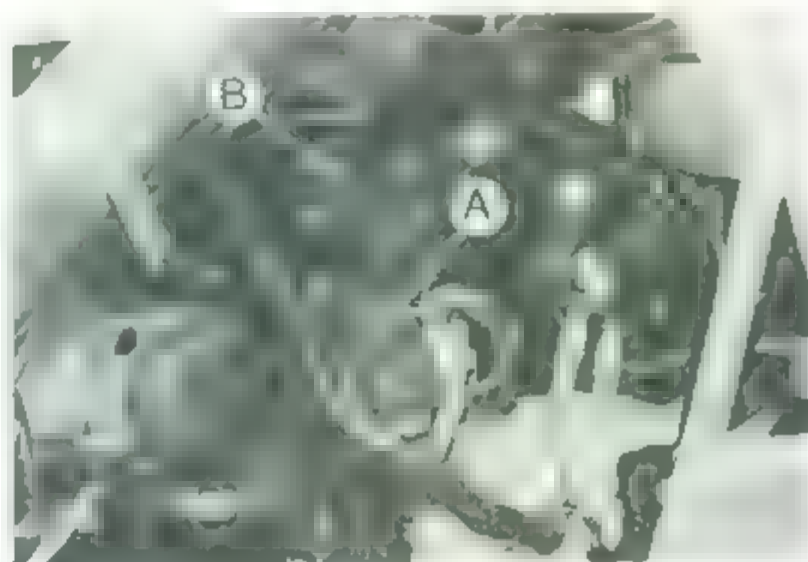
- Be careful not to overtighten the lens mounting screws

Turn Signal Light Bulb Replacement Note

- Be careful not to overtighten the lens mounting screws

Turn Signal Relay Inspection

- Remove
Side Covers
Seat
Fuel Tank
- Take the fan relay and the turn signal relay out of the bracket



A. Fan Relay

B Turn Signal Relay

- Check the condition of the relay for the following troubles

(1) Neither right nor left turn signals come on at all

- Check that battery voltage is normal
- Remove the fuel tank
- Unplug the relay leads and use an ohmmeter to check that there is continuity (close to zero ohms) between the relay terminals
- ★ If there is no ohmmeter reading, or if there is several ohms resistance, replace the relay with a new one
- Turn the meter to the 25 V DC range, connect the (+) meter lead to the brown lead that was disconnected from the relay, and connect the (-) meter lead to the orange lead
- With the ignition switch on, first switch the turn signal switch to the R and then to the L position. The meter should register battery voltage at either position
- ★ If it does not, the fuse, ignition switch, or wiring is at fault

(2) Both right or both left turn signals come on and stay on or flash too slowly

- Check that battery voltage is normal
- Check that all wiring connections are good
- Check that the turn signal bulbs and indicator bulbs are of the correct wattage

★ If all of the above check good, replace the relay

(3) A single light on one side comes on and stays on

★ Either the light that does not come on is burned out of the incorrect wattage, or the wiring is broken or improperly connected

(4) Neither light on one side comes.

★ Unless both lights for that side are burned out, the trouble is with the turn signal switch

(5) Flashing rate is too fast

★ If this occurs on both the right and left sides, check that the battery is not being overcharged.

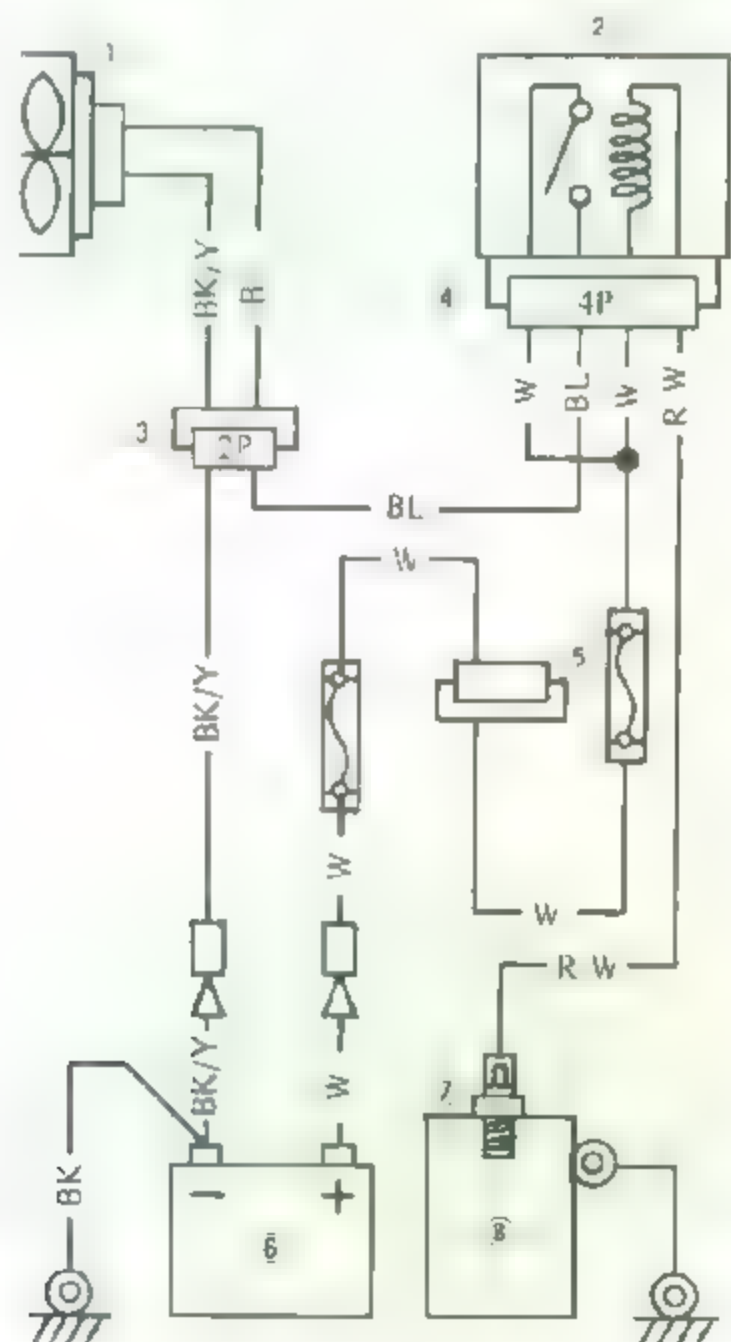
★ If the magneto and the battery voltage are normal, replace the turn signal relay.

★ If this occurs on only one side, one or both of the turn signal bulbs are of too high a wattage.

Radiator Fan System

Circuit Inspection

- Remove
 - Side Covers
 - Seat
 - Fuel Tank
- Disconnect female 4 pin connector from the fan relay.
- Connect the blue wire to any white wire in with a suitable wire
- ★ If the fan turns, inspect the following
 - Wires and Connectors
 - Fan Relay
 - Fan Switch
- ★ If the fan does not turn, inspect the following
 - Wires and Connectors
 - Fuse
 - Fan



- | | |
|----------------------|-----------------|
| 1 Radiator Fan | 5. 10A Fan Fuse |
| 2 Fan Relay | 6. Battery |
| 3 Fan Lead Connector | 7 Fan Switch |
| 4 4 Pin Connector | 8. Radiator |

15-32 ELECTRICAL SYSTEM

Fan Inspection

- Remove:
 - Side Covers
 - Seat
 - Fuel Tank
- Disconnect the fan lead connector
- Using two auxiliary wires, supply battery power to the fan

Wire Connections

Blue Lead	↔	Battery (+)
Black/Yellow Lead	↔	Battery (-)

- ★ If the fan does not turn at this time, the fan is defective and must be replaced



A. Fan Lead Connector (2 Pin)

Fan Relay Inspection

- Remove:
 - Side Covers
 - Seat
 - Fuel Tank
- Remove the fan relay.



A. Fan Relay

- Fan relay inspection is same as starter circuit relay inspection. Refer to the starter circuit relay inspection section

Meter and Gauge

Removal/Installation Note

CAUTION

- Place the meter or gauge so that the face is up. If a meter or gauge is left upside down or sideways for any length of time, it will malfunction

Meter Mounting Inspection

- Check to see that the rubber dampers are installed at the meter mounting bracket
- ★ Install a new damper where it is absent
- Check to see that the rubber dampers in the meter mounting bracket are in good condition. They should not be hard or cracked
- ★ Replace any damaged rubber dampers with new ones
- Check to see that all meter mounting nuts are tightened securely
- ★ Tighten any loose fasteners

Bulb Replacement Note

- To remove the wedge-base type bulbs (indicator and illumination), pull out the bulb sockets and pull the bulbs off the sockets

CAUTION

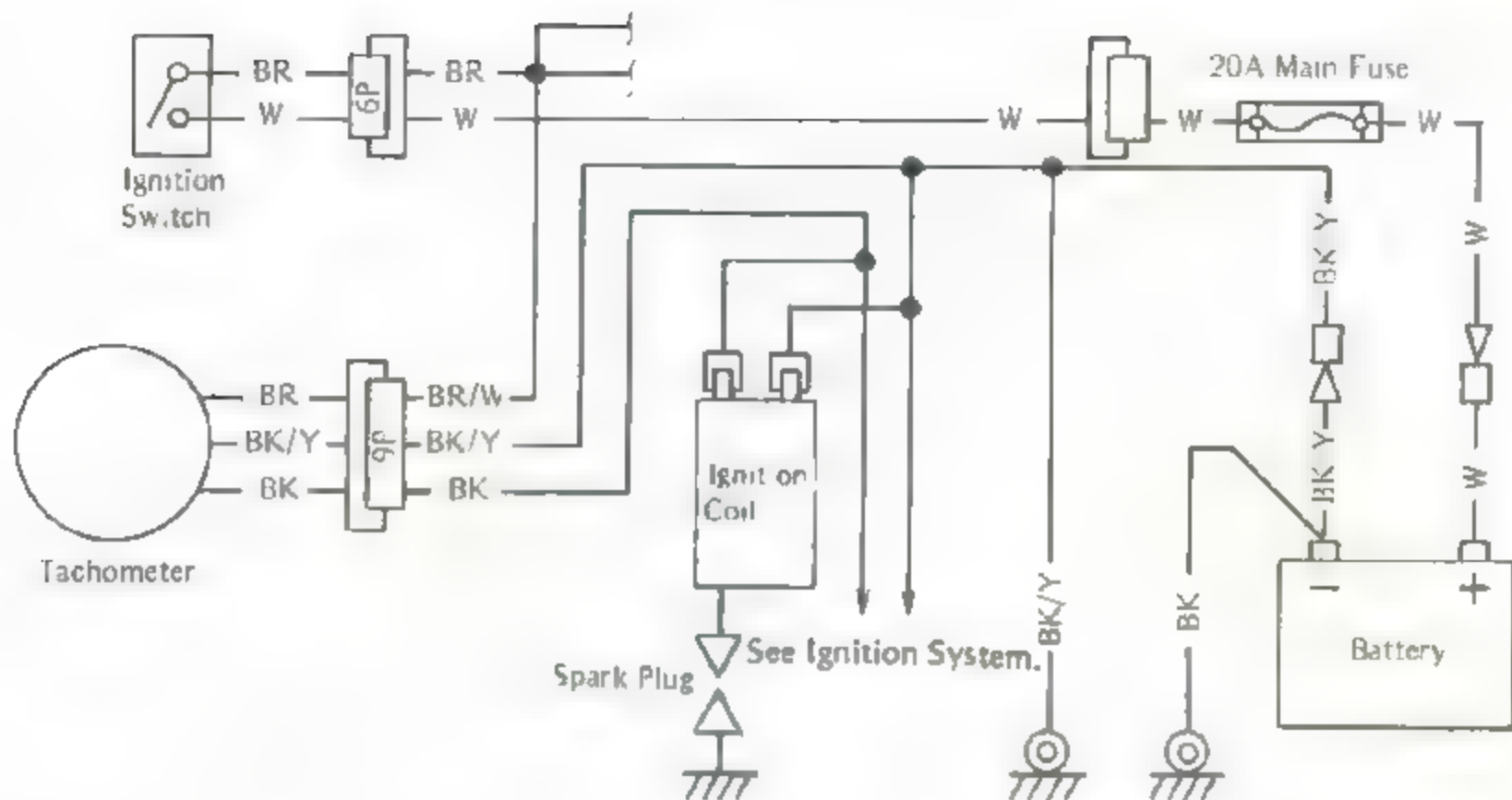
- Do not use bulbs rated for greater wattage than the specified value, as the meter or gauge panel could become warped by excessive heat radiated from the bulbs

Tachometer Inspection

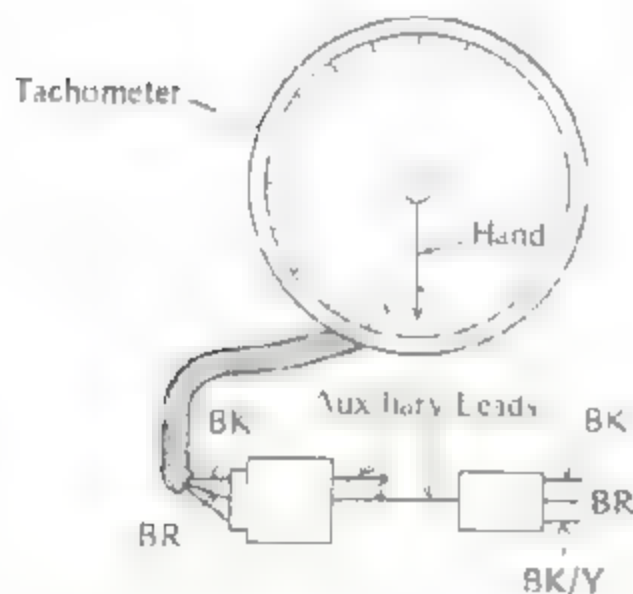
NOTE

- Tachometer inspection is explained on the assumption that the ignition system operates normally

- Check to see that the rubber dampers are installed in those positions
- ★ Install new dampers if any are missing
- Check to see that the rubber dampers are in good condition. They should not be hard or cracked
- ★ Replace any damaged rubber dampers with new ones
- Check to see that all meter mounting screws and nuts are tightened securely
- ★ Tighten any loose fasteners
- Check the tachometer circuit wiring.
- ★ If all wiring and components other than the tachometer unit check out good, the unit is suspect. Check the unit as shown
- Turn the ignition switch ON



- With the BR lead connected, open or connect the BK lead to the BR lead repeatedly. Then, the meter hand should flick.
- ★ If the hand does not flick, replace the meter unit.



Water Temperature Gauge Operation Inspection

- Prepare an auxiliary lead, and check the operation of the gauge.

Gauge Operation Test

Ignition Switch Position: ON

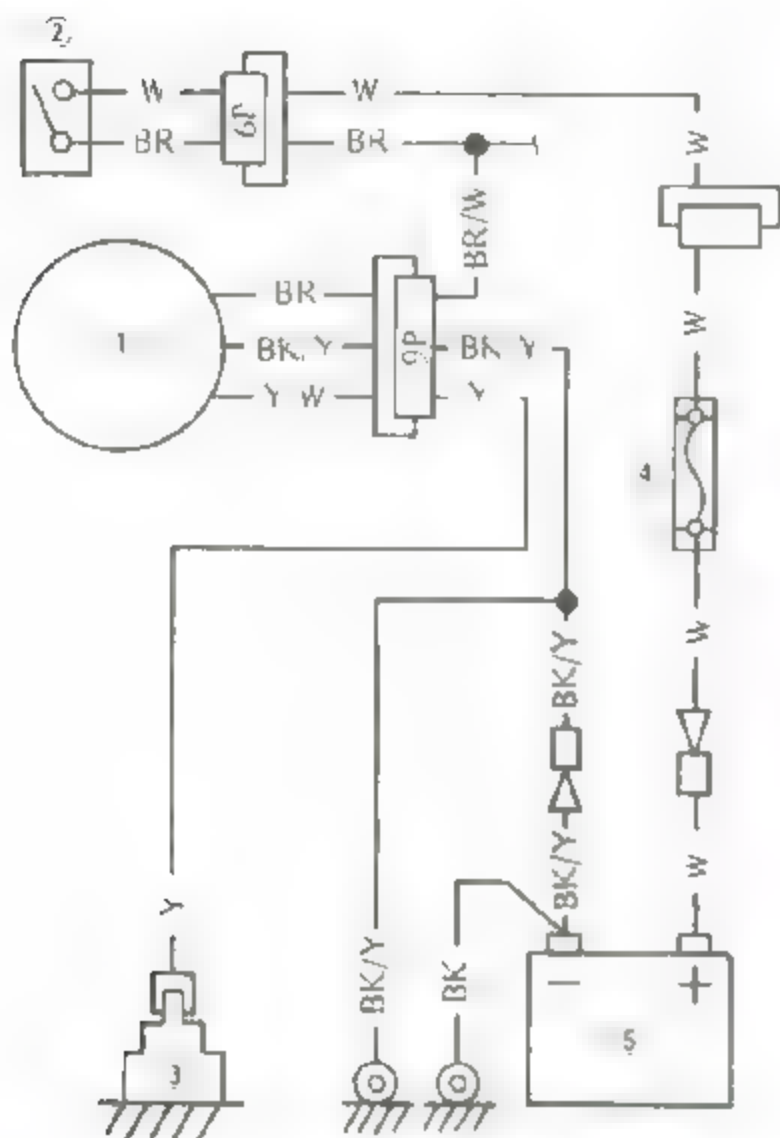
Lead Location: Female, Sensor Connector (disconnected)

Results: Gauge should read C when sensor lead is opened. Gauge should read H when sensor lead is grounded briefly to engine.

CAUTION

- Do not ground the wiring longer than necessary. After the needle swings to the H position, stop the test. Otherwise the gauge could be damaged.

- ★ If the gauge readings are correct, the water temperature sensor is bad. If these readings are not obtained, the trouble is with the gauge and/or wiring.
- Check the water temperature gauge circuit wiring (see Wiring Inspection).
- ★ If all wiring and components other than the water temperature gauge unit check out good, the gauge is defective.



1. Water Temperature Gauge
2. Ignition Switch
3. Water Temperature Sensor
4. 20A Main Fuse
5. Battery

Switch and Sensor

Brake Light Timing Inspection

- Turn on the ignition switch
- Check the operation of the rear brake light switch by depressing

Brake Light Timing

On after about 15 mm pedal travel



A. Brake Pedal

B. About 15 mm

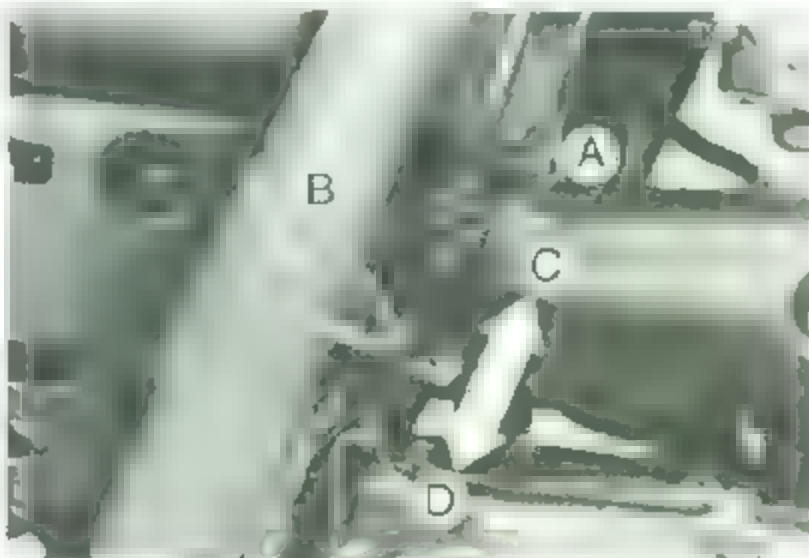
Brake Light Timing Adjustment

Brake light timing is adjusted by changing the position of the rear brake light switch

- Adjust the position of the switch so that the brake light goes on after the specified pedal travel by turning the adjusting nut

CAUTION

○ To avoid damaging the electrical connections inside the switch, be sure that the switch body does not turn during adjustment.



A. Rear Brake Light Switch
B. Adjusting Nut

C. Light sooner
D. Light later

Switch Inspection

- Using an ohmmeter check to see that only the connections shown in the table have continuity (about zero ohms)
- ★ If the switch has an open or short, repair it or replace it with a new one

IGNITION SWITCH CONNECTIONS						
Color	BK/Y	BK/W	W	BR	R	R/W
ON			○—○		○—○	
OFF	○—○					
LOCK	○—○					
P	○—○		○—○			

LEFT HANDLEBAR SWITCH CONNECTIONS													
Dimmer Switch				Turn Signal Switch				Horn Button			Passing Button		
Color	R/BK	BL/Y	R/Y	Color	GY	O	G	Color	BK/Y	BK/W	Color	R/BK	BR
HI				R									
				N(OFF, Push)				ON Push			ON(Push)		
LO				L									

RIGHT HANDLEBAR SWITCH CONNECTIONS												
Headlight Switch					Engine Stop Switch					Starter Button		
Color	BL	BL/Y	R/W	R/BL	Color	BK/Y	R	BK/W		Color	BK/R	BK/R
OFF					OFF	○—○				ON Push	○—○	
					RUN	○—○						
ON	○—○											

Front Brake Light Switch Connections		
Color	BK	BK
When brake lever is pulled in	○—○	
When brake lever is released		

Rear Brake Light Switch Connections		
Color	BR	HI
When brake pedal is pushed down	○—○	
When brake pedal is released		

Starter Lockout Switch Connections			
Color	BK/Y	BL/R	LG
When clutch lever is pulled in	○—○		
When clutch lever is released			○—○

Neutral Switch Connections	
Color	LG (SW. Terminal)
When transmission is in neutral	○—○
When transmission is not in neutral	

Side Stand Switch Connections		
Color	G/W	BR
When side stand is up	○—○	
When side stand is down		

15-36 ELECTRICAL SYSTEM

Fan Switch Inspection

- Remove the fan switch
- Suspend the switch in a container of water so that the temperature sensing projection and threaded portion are submerged
- Suspend an accurate thermometer in the water
- Place the container over a source of heat and gradually raise the temperature of the water while stirring the water gently

NOTE

- The switch and thermometer must not touch the container sides or bottom.

Fan Switch Connections

Rising temperature: From OFF to ON

at 94 ~ 100°C

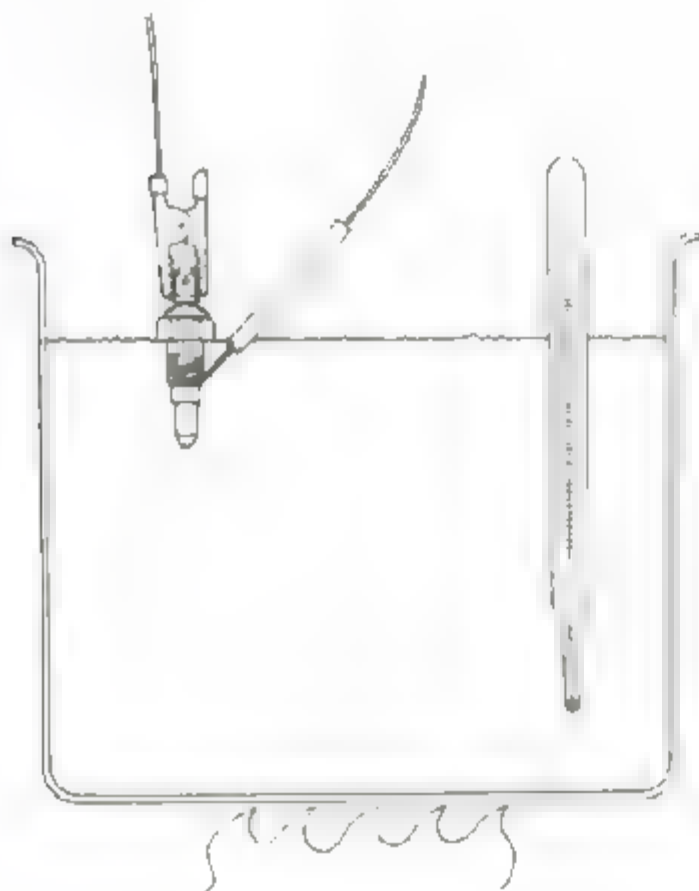
(201 ~ 212°F)

Falling temperature: From ON to OFF

above 91°C (196°F)

ON: Less than 0.5 Ω

OFF: More than 1 MΩ



Water Temperature Sensor Inspection

- Remove the water temperature sensor.
- Suspend the sensor in a container of water so that the temperature sensing projection and threaded portion are submerged
- Suspend an accurate thermometer in the water
- Place the container over a source of heat and gradually raise the temperature of the water while stirring the water gently

NOTE

- The switch and thermometer must not touch the container sides or bottom.

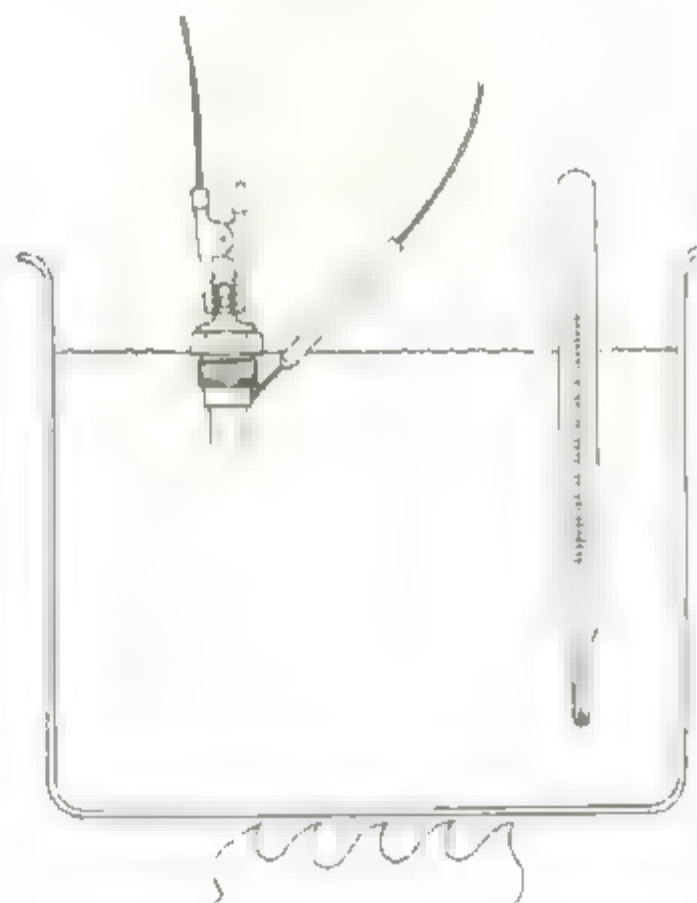
- Using an ohmmeter, measure the internal resistance of the sensor across the terminal and the body at the temperatures shown in the table.

- ★ If the ohmmeter does not show the specified values, replace the sensor.

Water Temperature Sensor Internal Resistance

47 ~ 57 Ω @ 80°C (176°F)

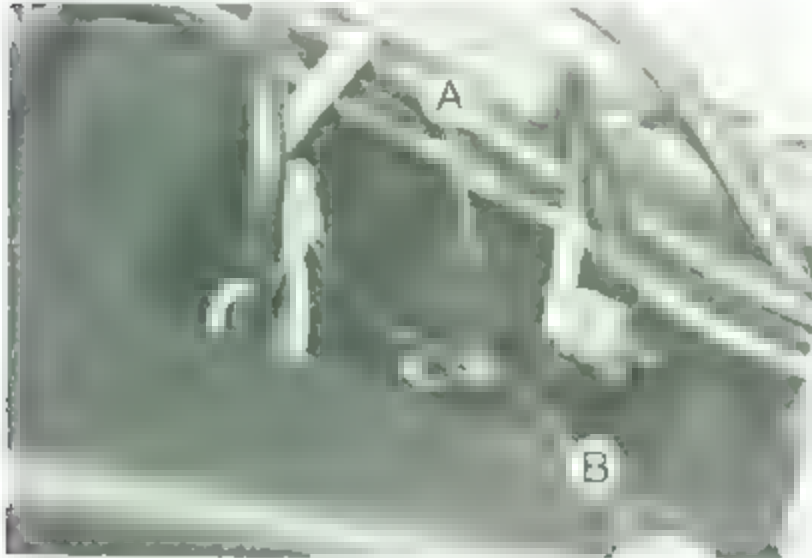
26 ~ 30 Ω @ 100°C (212°F)



Fuse

Main/Headlight Fuse Removal

- Remove
 - Side Covers
 - Seat
- Slide the rubber damper off the bracket
- Pull the fuse case out of the rubber damper.
- Open the case, and pull out the fuse carefully

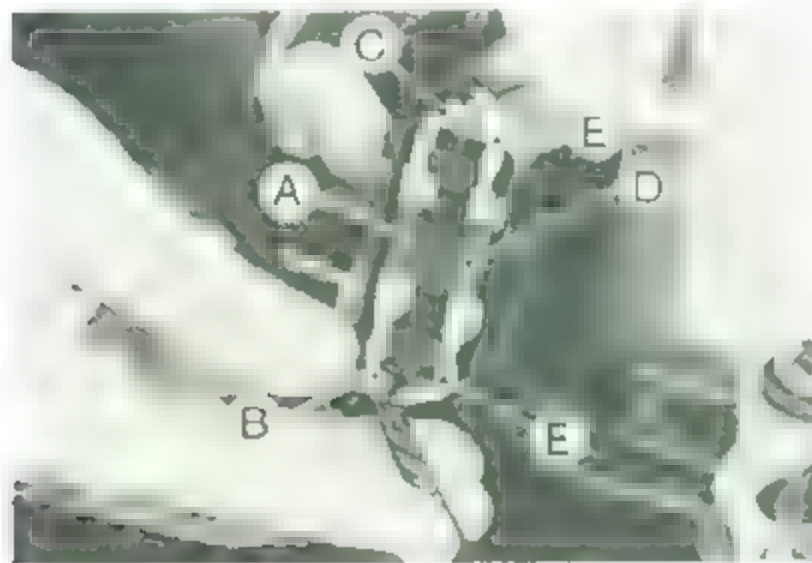


A. Rubber Damper

B. Fuse Case

Main/Headlight Fuse Installation Note

- Install the specified fuse in its place of the case



A. 10A Headlight Fuse

B. Brown Lead

C. Blue/White Lead

D. 20A Main Fuse

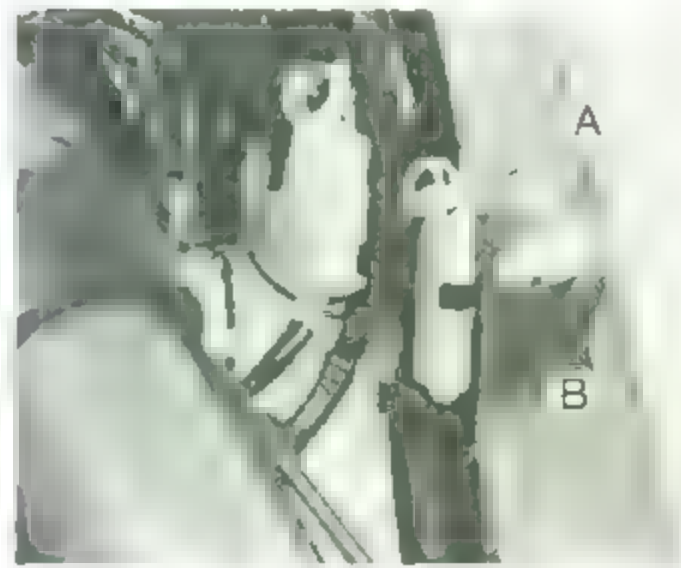
E. White Lead

Fan Fuse Removal

- Remove
 - Side Covers
 - Seat
 - Fuel Tank
- Pull the fuse case out of the clamp
- Open the case, and pull out the fuse carefully

Fan Fuse Installation Notes

- Install the fuse case so that it is parallel to the stay pipe.



A. Fuse Case

B. Stay Pipe

- Clamp the case with a tie band at the bracket portion

Inspection

- Remove the fuse
- Inspect the fuse element
- ★ If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit

CAUTION

- When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.

Appendix

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16-2 APPENDIX

Additional Considerations for Racing

This motorcycle has been manufactured for use in a reasonable and prudent manner and as a vehicle only. However, some may wish to subject this motorcycle to abnormal operation, such as would be experienced under racing conditions. KAWASAKI STRONGLY RECOMMENDS THAT ALL RIDERS RIDE SAFELY AND OBEY ALL LAWS AND REGULATIONS CONCERNING THEIR MOTORCYCLE AND ITS OPERATION.

Racing should be done under supervised conditions, and recognized sanctioning bodies should be contacted for further details. For those who desire to participate in competitive racing or related use, the following technical information may prove useful. However, please note the following important points:

- You are entirely responsible for the use of your motorcycle under abnormal conditions such as racing, and Kawasaki shall not be liable for any damages which might arise from such use.
- US model only: Kawasaki's Limited Motorcycle Warranty and Limited Emission Control Systems Warranty specifically exclude motorcycles which are used in competitive or related uses. Please read the warranty carefully.
- Motorcycle racing is a very sophisticated sport, subject to many variables. The following information is theoretical only, and Kawasaki shall not be liable for any damages which might arise from alterations utilizing this information.
- When the motorcycle is operated on public roads, it must be in its original state in order to ensure safety and compliance with applicable regulations.

Carburetor:

Sometimes an alteration may be desirable for improved performance under special conditions when proper mixture is not obtained after the carburetor has been properly adjusted, and all parts cleaned and found to be functioning properly.

If the engine still exhibits symptoms of overly lean carburetion after all maintenance and adjustments are correctly performed, the main jet can be replaced with a smaller or larger one. A smaller numbered jet gives a leaner mixture and a larger numbered jet a richer mixture.

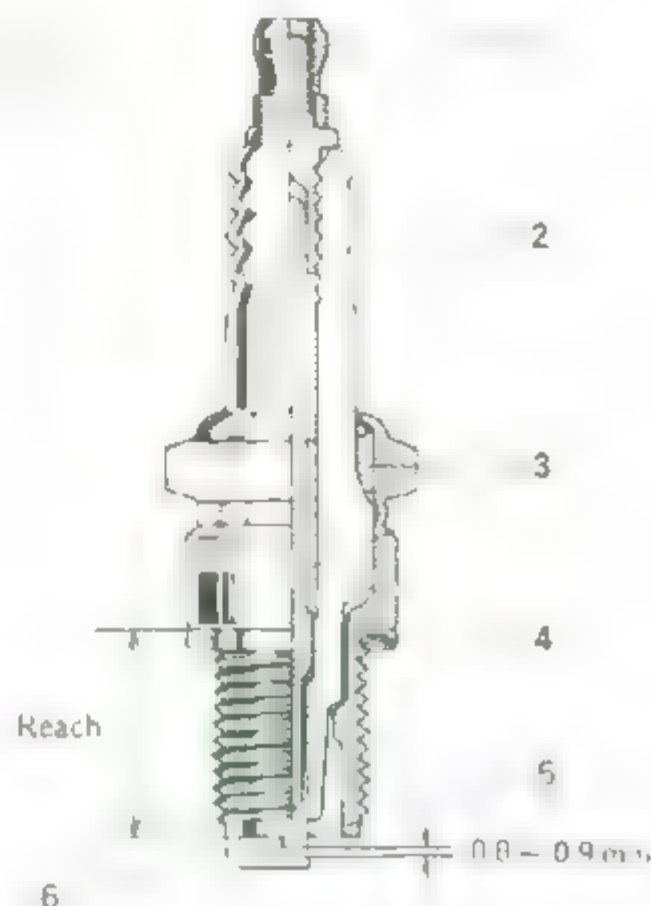
Spark Plug:

The spark plug ignites the fuel/air mixture in the combustion chamber. To do this effectively and at the proper time, the correct spark plug must be used, and the spark plug must be kept clean and adjusted.

Test have shown the plug listed in the "Specifications" section in the "General Information" chapter to be the best plug for general use.

Since spark plug requirements change with the ignition and carburetion adjustments and with riding conditions,

whether or not a spark plug of a correct heat range is used should be determined by removing and inspecting the plug.



- | | |
|-------------|--------------------|
| 1 Terminal | 4 Gasket |
| 2 Insulator | 5 Center Electrode |
| 3 Cement | 6 Side Electrode |

When a plug of the correct heat range is being used the electrodes will stay hot enough to keep all the carbon burned off, but cool enough to keep from damaging the engine and the plug itself. This temperature is about 400 ~ 800°C (750 ~ 1,450°F) and can be judged by noting the condition and color of the ceramic insulator around the center electrode. If the ceramic is clean and of a light brown color, the plug is operating at the right temperature.

A spark plug for higher operating temperatures is used for racing. Such a plug is designed for better cooling efficiency so that it will not overheat and thus is often called a "colder" plug. If a spark plug with too high a heat range is used — that is, a "cold" plug that cools itself too well — the plug will stay too cool to burn off the carbon, and the carbon will collect on the electrodes and the ceramic insulator.

The carbon on the electrodes conducts electricity, and can short the center electrode to ground by either coating the ceramic insulator or bridging across the gap. Such a short will prevent an effective spark. Carbon build-up on the plug can also cause other troubles. It can heat up red-hot and cause preignition and knocking, which may eventually burn a hole in the top of the piston.

Spark Plug Condition



Carbon Fouling



Oil Fouling



Normal Operation



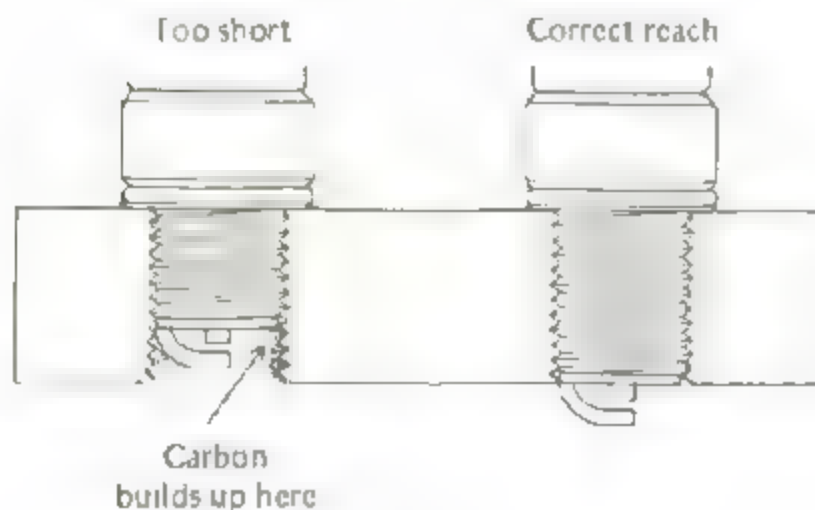
Overheating

Inspection

- Remove the spark plug and inspect the ceramic insulator
- ★ Whether or not the right temperature plug is being used can be ascertained by noting the condition of the ceramic insulator around the electrode. A light brown color indicates the correct plug is being used. If the ceramic is black, it indicates that the plug is firing at too low a temperature, so the next hotter type should be used instead. If the ceramic is white, the plug is operating at too high a temperature and it should be replaced with the next colder type.

CAUTION

- If the spark plug is replaced with a type other than the standard plug listed in the "Specifications" section make certain the replacement plug has the same thread pitch and reach (length of threaded portion) and the same insulator type (regular type or projected type) as the standard plug.
- If the plug reach is too short, carbon will build up on the plug hole threads in the cylinder head, causing overheating and making it very difficult to insert the correct spark plug later.
- If the reach is too long, carbon will build up on the exposed spark plug threads causing overheating, preignition, and possibly burning a hole in the piston top. In addition, it may be impossible to remove the plug without damaging the cylinder head.



Standard Spark Plug Threads

Diameter :	12 mm
Pitch :	1.25 mm
Reach :	19.0 mm

NOTE

- The heat range of the spark plug functions like a thermostat for the engine. Using the wrong type of spark plug can make the engine run too hot (resulting in engine damage) or too cold (with poor performance, misfiring, and stalling). The standard plug has been selected to match the normal usage of this motorcycle is combined street and highway riding. Unusual riding conditions may require a different spark plug heat range. For racing, install the colder plug.

Troubleshooting Guide

NOTE

⚠ This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties.

Engine Doesn't Start, Starting Difficulty:**Starter motor not rotating**

- Starter lockout or neutral switch trouble
- Starter motor trouble
- Battery voltage low
- Relays not contacting or operating
- Starter button not contacting
- Wiring open or shorted
- Ignition switch trouble
- Engine stop switch trouble
- Fuse blown

Starter motor rotating but engine doesn't turn over

- Starter motor clutch trouble

Engine won't turn over

- Valve seizure
- Valve lifter seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure
- Compression release cam spring broken (K.A.C.R.)
- Compression release cam sticks close (K.A.C.R.)

No fuel flow

- No fuel in tank
- Fuel tap turned off
- Fuel tap vacuum hose clogged
- Fuel tank air vent obstructed
- Fuel tap clogged
- Fuel line clogged
- Float valve clogged

Engine flooded

- Fuel level too high
- Float valve worn or stuck open
- Starting technique faulty (When flooded, crank the engine with the throttle fully opened to allow more air to reach the engine.)

No spark, spark weak

- Battery voltage low
- Ignition switch not on
- Engine stop switch turned off
- Clutch lever not pulled in or gear not in neutral
- Spark plug dirty, damaged, or misadjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- CDI unit trouble
- Pickup coil trouble
- Exciter coil shorted or open
- Ignition coil trouble
- Ignition coil resistor open

- Flywheel magneto damaged
- Ignition or engine stop switch shorted
- Neutral, clutch, or side stand switch trouble
- Wiring shorted or open
- Fuse blown

Fuel/air mixture incorrect

- Pilot screw and/or idle adjusting screw misadjusted
- Pilot jet or air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Starter jet clogged

Compression low

- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder/piston worn
- Piston rings bad (worn, weak, broken, or sticking)
- Piston ring/land clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)
- Compression release cam (K.A.C.R.) sticks open (Engine stalls when moving off)

Poor Running at Low Speed:**Spark weak**

- Battery voltage low
- Spark plug dirty, damaged, or misadjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- CDI unit trouble
- Pickup coil trouble
- Exciter coil shorted or open
- Ignition coil trouble
- Flywheel magneto damaged

Fuel/air mixture incorrect.

- Pilot screw misadjusted
- Pilot jet, or air passage clogged
- Air bleed pipe bleed holes clogged
- Air cleaner clogged, poorly sealed, or missing
- Air cleaner/carburetor poorly sealed
- Starter plunger stuck open
- Fuel level too high or too low
- Fuel tank air vent obstructed
- Carburetor holder loose

Compression low

- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder/piston worn
- Piston rings bad (worn, weak, broken or sticking)
- Piston ring/land clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)
- Compression release cam (K.A.C.R.) stick open (Engine stalls when moving off)

Other

- CDI unit trouble
- Carburetor vacuum piston does not slide smoothly
- Engine oil viscosity too high
- Drive train trouble
- Brakes dragging
- Over heating
- Clutch slipping
- Throttle valve does not open fully

Poor Running or No Power at High Speed:**Firing incorrect**

- Spark plug dirty, damaged, or maladjusted
- Spark plug cap or high tension wiring damaged
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- CDI unit trouble
- Pickup coil trouble
- Exciter coil shorted or open
- Ignition coil trouble
- Flywheel magneto damaged

Fuel/air mixture incorrect

- Main jet clogged or wrong size
- Jet needle or needle jet worn
- Fuel level too high or too low
- Air bleed pipe bleed holes clogged
- Air cleaner clogged, poorly sealed, or missing
- Air cleaner/carburetor poorly sealed
- Starter plunger stuck open
- Fuel to carburetor insufficient
- Water or foreign matter in fuel
- Carburetor holder loose
- Fuel tank air vent obstructed
- Fuel tap clogged
- Fuel line clogged

Compression low

- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston rings bad (worn, weak, broken, or sticking)
- Piston ring/land clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)
- Compression release cam (K.A.C.R.) sticks open (Engine stalls when moving off)

Knocking

- Carbon built up in combustion chamber
- Fuel poor quality or incorrect
- Spark plug incorrect
- CDI unit trouble

Miscellaneous

- Carburetor vacuum piston does not slide smoothly
- Timing not advancing
- Brakes dragging
- Clutch slipping
- Overheating
- Engine oil level too high
- Engine oil viscosity too high
- Balancer mechanism malfunctioning
- Drive train trouble

Crankshaft bearing worn or damaged

Overheating:**Firing incorrect:**

- Spark plug dirty, broken, or maladjusted
- Spark plug incorrect
- CDI unit trouble

Fuel/air mixture incorrect:

- Main jet clogged or wrong size
- Fuel level too low
- Carburetor holder loose
- Air cleaner poorly sealed, or missing
- Air cleaner duct poorly sealed
- Air cleaner clogged

Compression high

- Carbon built up in combustion chamber

Engine load faulty

- Clutch slipping
- Engine oil level too high
- Engine oil viscosity too high
- Brakes dragging

Lubrication inadequate

- Engine oil level too low
- Engine oil poor quality or incorrect

Gauge incorrect

- Water temperature gauge broken
- Water temperature sensor broken

Coolant incorrect

- Coolant level too low
- Coolant deteriorated

Cooling system component incorrect

- Radiator clogged
- Thermostat trouble
- Radiator cap trouble
- Thermostat electric fan switch trouble
- Fan relay trouble
- Fan motor broken
- Fan blade damaged
- Water pump not rotating
- Water pump impeller damaged

Over Cooling:**Gauge incorrect**

- Water temperature gauge broken
- Water temperature sensor broken

Cooling system component incorrect

- Thermostatic fan switch trouble
- Thermostat trouble

16-6 APPENDIX

Clutch Operation Faulty:

Clutch slipping

- No clutch lever play
- Clutch cable maladjusted
- Clutch inner cable catching
- Friction plate worn or warped
- Steel plate worn or warped
- Clutch spring broken or weak
- Clutch release mechanism trouble
- Clutch hub or housing unevenly worn

Clutch not disengaging properly

- Clutch lever play excessive
- Clutch plate warped or too rough
- Clutch spring tension uneven
- Engine oil deteriorated
- Engine oil viscosity too high
- Engine oil level too high
- Clutch housing frozen on drive shaft
- Clutch release mechanism trouble
- Clutch hub nut loose

Gear Shifting Faulty:

Doesn't go into gear, shift pedal doesn't return

- Clutch not disengaging
- Shift fork bent or seized
- Gear stuck on the shaft
- Gear positioning lever binding
- Shift return spring weak or broken
- Shift return spring pin loose
- Shift mechanism arm spring broken
- Shift mechanism arm broken
- Shift drum broken

Jumps out of gear

- Shift fork worn
- Gear groove worn
- Gear dogs and/or dog holes worn
- Shift drum groove worn
- Gear positioning lever spring weak or broken
- Shift fork guide pin worn
- Drive shaft, output shaft, and/or gear spines worn

Overshifts

- Gear positioning lever spring weak or broken
- Shift mechanism arm spring broken

Abnormal Engine Noise:

Knocking

- CDI unit trouble
- Carbon built up in combustion chamber
- Fuel poor quality or incorrect
- Spark plug incorrect
- Overheating

Piston slap

- Cylinder/piston clearance excessive
- Cylinder piston worn
- Connecting rod bent
- Piston pin, piston holes worn

Valve noise

- Valve clearance incorrect
- Valve spring broken or weak
- Camshaft bearings worn
- Valve lifter worn

Other noise

- Connecting rod small end clearance excessive
- Connecting rod big end clearance excessive

Piston ring worn, broken or stuck

Piston seizure or damaged

Cylinder head gasket leaking

Exhaust pipe leaking at cylinder head connection

Crankshaft runout excessive

Engine mounts loose

Crankshaft bearing worn

Primary gear worn or chipped

Magneto flywheel loose

Camshaft chain tensioner trouble

Camshaft chain, sprockets, guides worn

Balancer chain, sprockets, chain tensioner worn

Balancer mechanism springs weak or broken

Balancer bearings worn

Abnormal Drive Train Noise:

Clutch noise

Clutch rubber damper deteriorated

Clutch housing, friction plate clearance excessive

Clutch housing gear/primary gear backlash excessive

Metal chip jammed in clutch housing gear teeth

Transmission noise

Bearings worn

Transmission gears worn or chipped

Metal chips jammed in gear teeth

Engine oil insufficient

Drive chain noise

Drive chain adjusted improperly

Chain worn

Rear and/or engine sprocket(s) worn

Chain lubrication insufficient

Rear Wheel misaligned

Abnormal Frame Noise:

Front fork noise

Oil insufficient or too thin

Spring weak or broken

Rear shock absorber noise

Shock absorber damaged

Disc brake noise

Pad installed incorrectly

Pad surface glazed

Disc warped

Caliper trouble

Cylinder damaged

Other noise

Brackets, nuts, bolts, etc. not properly mounted or tightened

Exhaust Smokes Excessively:

White smoke

Piston oil ring worn

Cylinder worn

Valve oil seal damaged

Valve guide worn

Cylinder head gasket damaged

Engine oil level too high

Black smoke

Air cleaner clogged

Main jet too large or fallen off

Starter plunger stuck open

Fuel level too high

Brown smoke:

- Main jet too small
- Fuel level in carburetor float bowl too low
- Air cleaner duct loose
- Air cleaner poorly sealed or missing

- Load excessive (e.g., bulb of excessive wattage)

- Ignition switch trouble

- Flywheel magneto damaged

- Wiring faulty

- Regulator/rectifier trouble

Handling and/or Stability Unsatisfactory:**Handlebar hard to turn.**

- Cable routing incorrect
- Hose routing incorrect
- Wiring routing incorrect
- Steering stem locknut too tight
- Bearing damaged
- Bearing race dented or worn
- Steering stem lubrication inadequate
- Steering stem bent
- Tire air pressure too low

Handlebar shakes or excessively vibrates.

- Tire worn
- Swing arm bushing or needle bearing damaged
- Rim warped, or not balanced
- Front, rear axle runout excessive
- Wheel bearing worn
- Handlebar clamp loose
- Steering stem head nut loose

Handlebar pulls to one side

- Frame bent
- Wheel misalignment
- Swing arm bent or twisted
- Swing arm pivot shaft runout excessive
- Steering maladjusted
- Steering stem bent
- Front fork leg bent
- Right/left front fork oil level uneven

Shock absorption unsatisfactory

- (Too hard)
- Front fork oil excessive
- Front fork oil viscosity too high
- Front fork air pressure too high
- Front fork leg bent
- Tire air pressure too high
- Rear shock absorber maladjusted
- (Too soft)
- Front fork oil insufficient and/or leaking
- Front fork oil viscosity too low
- Front fork, rear shock absorber spring weak
- Rear shock absorber oil leaking
- Rear shock absorber maladjusted

Brakes Don't Hold

- Air in the brake line
- Pad or disc worn
- Brake fluid leak
- Disc warped
- Contaminated pads
- Brake fluid deteriorated
- Primary or secondary cup damaged
- Master cylinder scratched inside

Battery Discharged:

- Battery faulty (e.g., plates sulphated, shorted through sedimentation, electrolyte level too low)
- Battery leads making poor contact

Battery Overcharged:

- Regulator/rectifier trouble

- Battery trouble

16-8 APPENDIX

General Lubrication

Lubrication

- Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime
- Lubricate the points listed below with indicated lubricant

NOTE

- *Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure spray water, perform the general lubrication.*

Pivots: Lubricate with Motor Oil

Side Stand
Clutch Lever
Brake Lever
Brake Pedal
Rear Brake Rod Joint

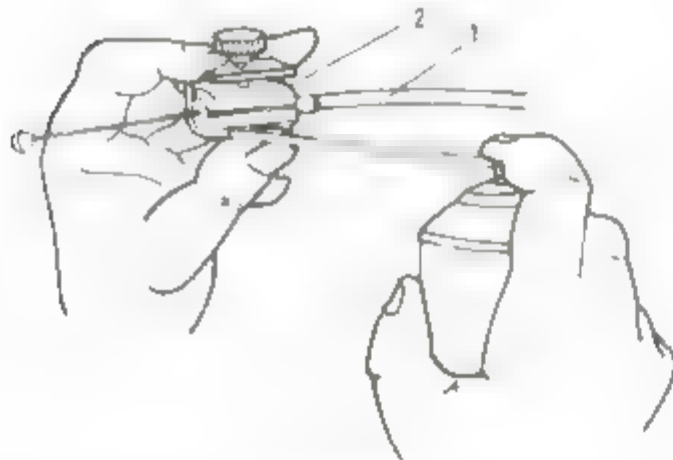
Points: Lubricate with Grease

Throttle Inner Cable Lower Ends
Clutch Inner Cable Upper End
Side Stand Switch Inner Cable Lower End
Speedometer Inner Cable*

*Grease the lower part of the inner cable sparingly

Cables: Lubricate with Rust Inhibitor.

Choke Cable
Throttle Cables
Clutch Cable
Side Stand Switch Cable



1. Cable
2. Pressure Cable Luber K56019 021

Unit Conversion Table

Prefixes for Units:

Prefix	Symbol	Power
mega	M	$\times 1,000,000$
kilo	k	$\times 1,000$
centi	c	$\times 0.01$
milli	m	$\times 0.001$
micro	μ	$\times 0.000001$

Units of Mass:

kg	\times	2.205	=	lb
g	\times	0.03527	=	oz

Units of Volume:

L	\times	0.2642	=	gal (US)
L	\times	0.2200	=	gal (imp)
L	\times	1.057	=	qt (US)
L	\times	0.8799	=	qt (imp)
L	\times	2.113	=	pint (US)
L	\times	1.816	=	pint (imp)
mL	\times	0.03381	=	oz (US)
mL	\times	0.02816	=	oz (imp)
mL	\times	0.06102	=	cu in

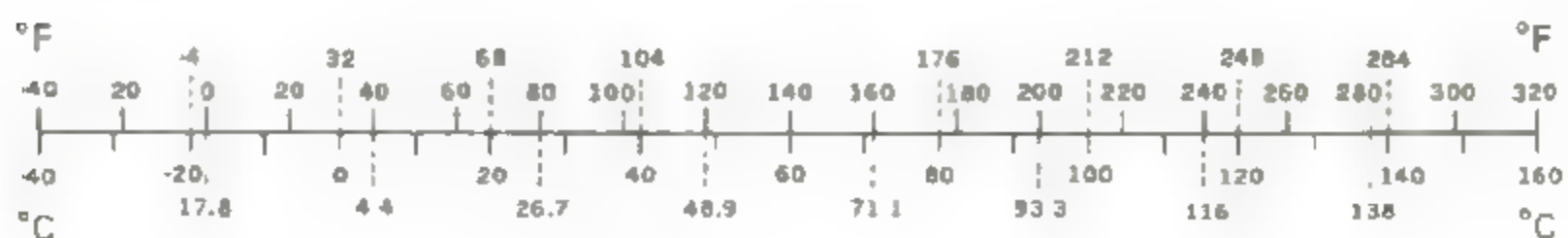
Units of Force:

N	\times	0.1020	=	kg
N	\times	0.2248	=	lb
kg	\times	9.807	=	N
kg	\times	2.205	=	lb

Units of Temperature:

$$\frac{9(^{\circ}\text{C} + 40)}{5} - 40 = ^{\circ}\text{F}$$

$$\frac{5(^{\circ}\text{F} + 40)}{9} - 40 = ^{\circ}\text{C}$$



Units of Length:

km	\times	0.6214	=	mile
m	\times	3.281	=	ft
mm	\times	0.03937	=	in

Units of Torque:

N-m	\times	0.1020	=	kg-m
N-m	\times	0.7376	=	ft-lb
N-m	\times	8.851	=	in-lb
kg-m	\times	9.807	=	N-m
kg-m	\times	7.233	=	ft-lb
kg-m	\times	86.80	=	in-lb

Units of Pressure:

kPa	\times	0.01020	=	kg/cm ²
kPa	\times	0.1450	=	psi
kPa	\times	0.7501	=	cm Hg
kg/cm ²	\times	98.07	=	kPa
kg/cm ²	\times	14.22	=	psi
cm Hg	\times	1.333	=	kPa

Units of Speed:

km/h	\times	0.6214	=	mph
------	----------	--------	---	-----

Units of Power:

kW	\times	1.360	=	PS
kW	\times	1.341	=	HP
PS	\times	0.7355	=	kW
PS	\times	0.9863	=	HP

Supplement - 1990 Model

This "Supplement - 1990 Model" chapter is designed to be used in conjunction with the front part of this manual (up to the end of the "Appendix" chapter). The maintenance and repair procedures described in this chapter are only those that are unique to the 1990 KL650-B2 and 1990 KL550-B2 motorcycles. Most service operations for these models remain identical to those described in front of this chapter.

Complete and proper servicing of the 1990 KL650-B2 and 1990 KL500-B2 motorcycles therefore requires mechanics to read both this chapter and the text in front of this chapter.

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General Information

General Specifications

Items	KL650-B2	KL500-B2
Dimensions.		
Overall length	2 220 mm, (US)(Ca)(C)(SA) 2 175 mm	2 220 mm
Overall width	920 mm	← -
Overall height	1 300 mm	← ---
Wheelbase	1 480 mm	← -
Road clearance	210 mm	← -
Seat height	870 mm	← - -
Dry weight	159 kg (Ca) 159.5 kg	159 kg
Curb weight:	87 kg	← ---
Front	97 kg (Ca) 97.5 kg	97 kg
Rear		
Fuel tank capacity	23 L	← ---
Performance:		
Braking distance	12.5 m from 50 km/h	← ---
Minimum turning radius	2.4 m	← ---
Engine.		
Type	4-stroke, DOHC, 4-valve, 1-cylinder	← -
Cooling system	Liquid-cooled	← ---
Bore and stroke	100.0 x 83.0 mm	89.0 x 80.0 mm
Displacement	651 mL	497 mL
Compression ratio	9.5 : 1	← ---
Maximum horsepower	35.3 kW (48 PS) @ 6 500 r/min (rpm) (A)(E)(I) 30.2 kW (41 PS) @ 7 000 r/min (rpm) (F) 29.3 kW (39.8 PS) @ 7 000 r/min (rpm). UTAC's norms (G) 19.9 kW (27 PS) @ 5 500 r/min (rpm): DIN	29.4 kW (40 PS) @ 7 500 r/min (rpm)
Maximum torque	54.9 N·m (5.6 kg·m, 40.5 ft·lb) @ 5 500 r/min (rpm) (A)(E) 48.1 N·m (4.9 kg·m, 35.4 ft·lb) @ 5 000 r/min (rpm) (G) 45.1 N·m, (4.6 kg·m, 33.3 ft·lb) @ 2 800 r/min (rpm): DIN	38.2 N·m (3.9 kg·m, 28.2 ft·lb) @ 5 000 r/min (rpm)
Carburetion system	Carburetor, Keihin CVK40	← -
Starting system	Electric Starter	← ---
Ignition system	CDI	← - -
Timing advance	Electronically advanced	← -
Ignition timing	From 10° BTDC @ 1 300 r/min (rpm) to 30° BTDC @ 3 300 r/min (rpm)	← -
Spark plug	NGK DPR8EA-9 or ND X24EPR U9 (US)(C)(I)(SA) NGK DP8EA-9, or ND X24EP-U9	← -

Items		KL650-B2	KL500-B2
Valve timing:			
Inlet	Open	19° (BTDC)	←
	Close	69° (ABDC)	←---
	Duration	268°	←---
Exhaust	Open	57° (BBDC)	←---
	Close	31° (ATDC)	←---
	Duration	268°	←---
Lubrication system		Forced lubrication (wet sump)	←---
Engine oil			
Grade		SE or SF class	←---
Viscosity		SAE10W40, 10W50, 20W40, or 20W50	←---
Capacity		2.5 L	←---
Drive Train:			
Primary reduction system:			
Type		Gear	←---
Reduction ratio		2.272 (75/33)	←---
Clutch type		Wet multi disc	←---
Transmission:			
Type		5-speed, constant mesh, return shift	←---
Gear ratios:	1st	2.266 (34/15)	←---
	2nd	1.529 (26/17)	←---
	3rd	1.181 (26/22)	←---
	4th	0.954 (21/22)	←---
	5th	0.791 (19/24)	←---
Final drive system:			
Type		Chain drive	←---
Reduction ratio		2.866 (43/15)	3.133 (47/15)
Overall drive ratio		5.157 @Top gear	5.637 @Top gear
Frame:			
Type		Tubular, semi-double cradle	←---
Caster (rake angle)		28°	←---
Trail		113 mm	←---
Front tire			
Type		Tube type	←---
Size		90/90 21 54S	←---
Rear tire			
Type		Tube type	←---
Size		130/80 17 65S	←---
Front suspension			
Type		Telescopic air fork (pneumatic)	←---
Wheel travel		220 mm	←---
Rear suspension			
Type		Swing arm (uni trak)	←---
Wheel travel		200 mm	←---
Brake type			
Front		Single disc	←---
Rear		Single disc	←---

17-4 SUPPLEMENT - 1990 MODEL

Items	KL650-B2	KL500-B2
Electrical Equipment:		
Battery	12 V 14 Ah	←---
Headlight		
Type	Semi-sealed beam	←---
Bulb	12 V 60/55 W (quartz-halogen)	←---
Tail/brake light	12 V 5/21 W, (US)(Ca)(C)(SA) 12 V 8/27 W	←---
Alternator		
Type	Three-phase AC	←---
Rated output	14 A @8 000 r/min (rpm), 14 V	←---

Specifications subject to change without notice, and may not apply to every country

Abbreviation

(A) : Australian Model
(C) : Canadian Model
(Ca) : California Vehicle
(E) : European Model
(F) : French Model

(G) : West German Model
(I) : Italian Model
(S) : Swiss Model
(SA) : South African Model
(US) : US Model

Periodic Maintenance Chart

The scheduled maintenance must be done in accordance with this chart to keep the motorcycle in good running condition. The initial maintenance is vitally important and must not be neglected.

OPERATION	FREQUENCY	Whichever comes first ↓ Every	† ODOMETER READING							See Page
			800 km	5,000 km	10,000 km	15,000 km	20,000 km	25,000 km	30,000 km	
Spark plug — clean			•	•	•	•	•	•		15-21
Spark plug — check*			•	•	•	•	•	•		15-21
Valve clearance — check*		•		•		•		•		4-16
Air cleaner element — clean		•		•		•		•		2-15
Air cleaner element — replace	5 cleanings	•				•		•		2-15
Throttle grip play — check*		•		•		•		•		2-6
Idle speed — check*		•	•	•	•	•	•	•		2-9
Fuel system — check*				•		•		•		2-11
Spark arrestor (C, US) — clean			•	•	•	•	•	•		
Evaporative emission control system (Cal) — change*		•	•	•	•	•	•	•		
Engine oil — change	year	•		•		•		•		6-6
Oil filter — replace		•		•		•		•		6-6
Radiator hoses, connections — check*	year	•		•		•		•		3-13
Coolant — change	2 years							•		3-5
Fuel hose — replace	4 years									
Balancer chain tension — adjust		•	•	•	•	•	•	•		5-17
Clutch — adjust		•	•	•	•	•	•	•		5-6
Drive chain wear — check*			•	•	•	•	•	•		10-5
Drive chain — lubricate	300 km									10-5
Drive chain slack — check*	800 km									10-4
Brake lining or pad wear — check*			•	•	•	•	•	•		11-8
Brake fluid level — check*	month	•	•	•	•	•	•	•		11-13
Brake fluid — change	2 years					•				11-13
Brake hose — replace	4 years									11-16
Brake master cylinder cup and dust seal — replace	2 years									11-11
Caliper piston seal and dust seal — replace	2 years									11-8
Brake light switch — check*		•	•	•	•	•	•	•		15-34
Steering — check*		•	•	•	•	•	•	•		13-4
Steering stem bearing — lubricate	2 years					•				13-7
Front fork oil — change								•		12-5
Tire wear — check*			•	•	•	•	•	•		9-9
Spoke tightness and rim runout — check*		•	•	•	•	•	•	•		9-6
Swing arm pivot, uni-trak linkage — lubricate				•		•		•		12-3
Battery electrolyte level — check*	month	•	•	•	•	•	•	•		15-11
General lubrication — perform			•	•	•	•	•	•		16-8
Nut, bolt, and fastener tightness — check*		•		•		•		•		1-15
Coolant filter (UK) — clean	year									17-9

† : For higher odometer readings, repeat at the frequency interval established here.

* : Replace, add, adjust, clean, or torque if necessary

(C) : Canadian Model

(Cal) : California Vehicle

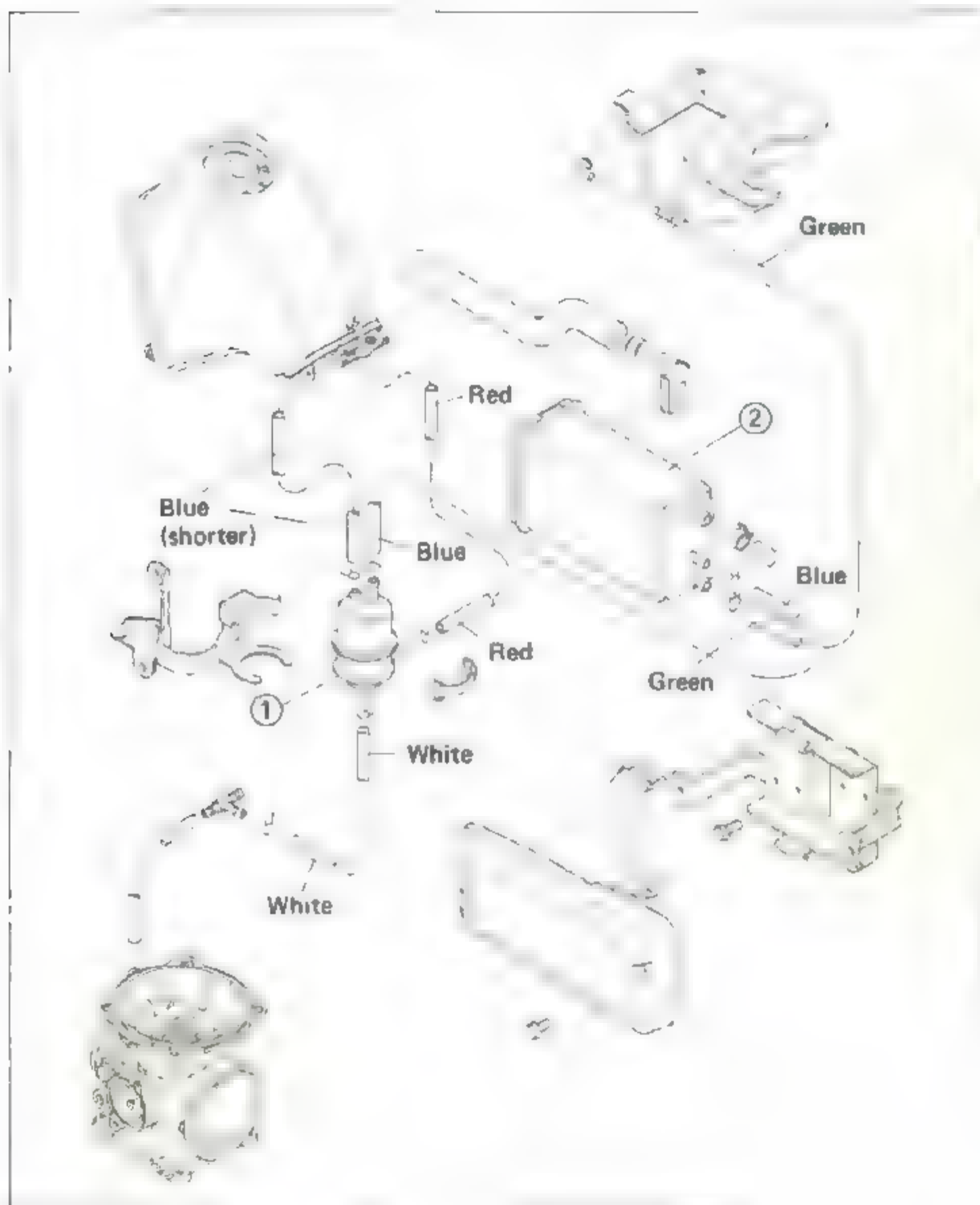
(US) : US Model

(UK) : UK Model

Fuel System

Exploded View

US California Vehicle Only



Specifications

Item		KL650-B2	KL500-B2
Throttle Grip Free Play		2 ~ 3 mm	←
Choke Cable Free Play		2 ~ 3 mm	←----
Idle Speed		1 300 ±50 r/min (rpm)	←----
Carburetor Specifications:			
Make/type		Keihin/CVK40	←----
Main jet		#148, (UK) (G) #145	#148
Main air jet		#50	←----
Needle jet		#6	←----
Jet needle		N31R, (G) N74D, (UK) N74C, (S) N60N	N54G
Pilot jet		#40	←----
Pilot air jet		#70	←----
Pilot screw		1½, (S) 1½, (UK) 1½ (turns out)	1½ (turns out)
Starter jet		#52	←----
Service fuel level (above the bottom edge of the carburetor body)		0.5 ±1 mm	←----
Float height		17.5 mm	←----
Air Cleaner:			
Air cleaner element oil:	Grade	SE class	←----
	Viscosity	SAE 30	←----

(UK) : UK Model

(G) : West German Model

(S) : Swiss Model

Evaporative Emission Control System (US California Vehicle only)

The Evaporative Emission Control System routes fuel vapors from the fuel system into the running engine or stores the vapors in a canister when the engine is stopped. Although no adjustments are required, a thorough visual inspection must be made at the intervals specified by the Periodic Maintenance Chart.

Parts Removal/Installation Notes

WARNING

- Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

CAUTION

- If gasoline, solvent, water, or any other liquid enters the canister, the canister's vapor absorbing capacity is greatly reduced. If the canister does become contaminated, replace it with a new one.
- To prevent the gasoline from flowing into the canister or from flowing out of the canister, hold the separator perpendicular to the ground.
- Connect the hoses according to the diagram of the system. Make sure they do not get pinched or kinked.

Hose Inspection (Periodic Inspection)

- Check that the hoses are securely connected.
- Replace any kinked, deteriorated or damaged hoses.

Separator Inspection (Periodic Inspection)

- Remove the seats and the right side cover.
- Visually inspect the separator for cracks and other damage.
- ★ If the separator has any cracks or is badly damaged, replace it with a new one.

Separator Operation Test

WARNING

- Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.
- Connect the hoses to the separator, and install the separator on the motorcycle.
- Disconnect the breather hose from the separator, and inject about 20 mL of gasoline into the separator through the hose fitting.
- Disconnect the fuel return hose from the fuel tank.
- Run the open end of the return hose into the container level with the tank top.
- Start the engine, and let it idle.
- ★ If the gasoline in the separator comes out of hose, the separator works well. If it does not, replace the separator with a new one.

Canister Inspection

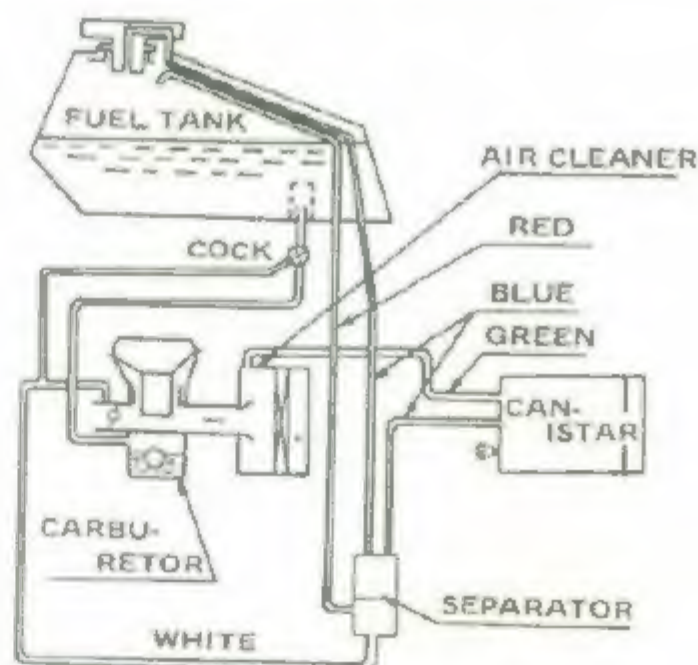
- ★ If the canister has any crack or bad damage, replace it with a new one.

NOTE

- The canister is designed to work well through the motorcycle's life without any maintenance if it is used under normal conditions.

Evaporative Emission Control System

VACUUM HOSE ROUTING DIAGRAM



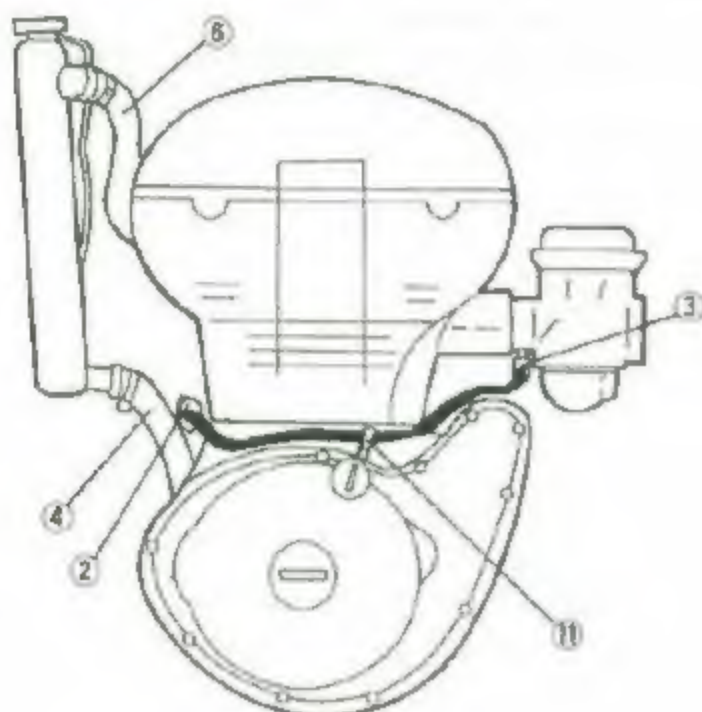
Carburetor

Coolant Filter Cleaning (KL650-B2 UK Model)

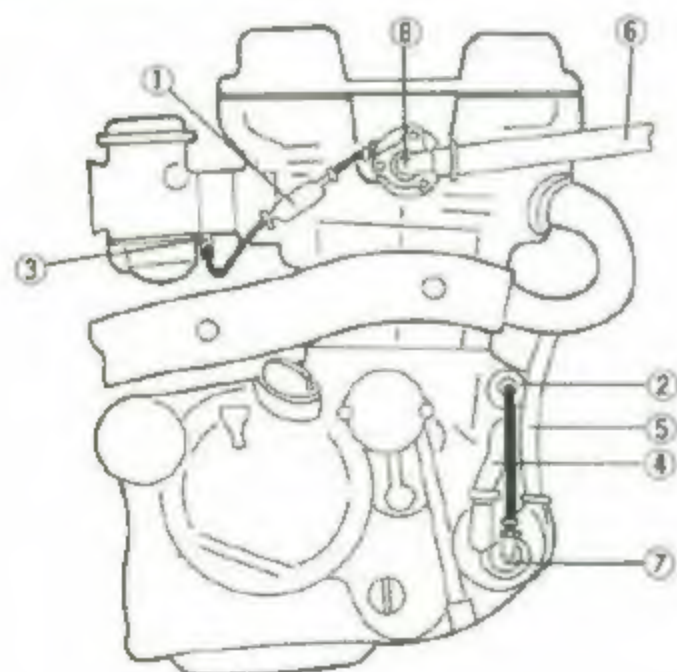
Before winter season start, clean the filter of carburetor system.

- Remove the lower fairing.
- Drain the coolant (see Cooling System chapter).
- Remove the filter from the cooling hoses of carburetor system.
- Blow off dirt and sediment on the filter with compressed air.

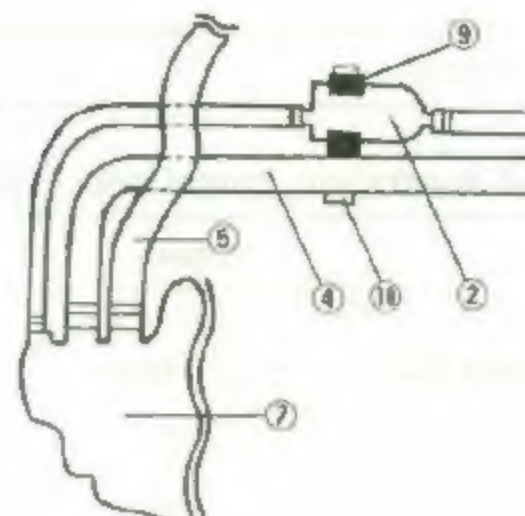
Hose Routing (Engine Left Side View)



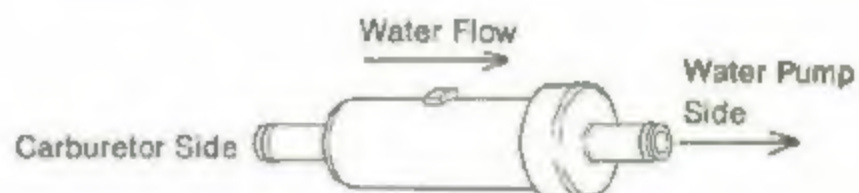
(Engine Right Side View)



(Water Pump Right Side View)



(Valve)



- | | |
|------------------------|---------------------------|
| 1. Filter | 7. Water Pump |
| 2. Valve | 8. Thermostat Housing Cap |
| 3. Joint Pipe | 9. Damper |
| 4. Lower Radiator Hose | 10. Band |
| 5. Water Pump Hose | 11. Clamp |
| 6. Upper Radiator Hose | |

High Altitude Performance Adjustment (US Model)

- To improve the EMISSION CONTROL PERFORMANCE of the vehicles operated above 4 000 feet, Kawasaki recommends the following Emission Protection Agency (EPA) approved modification.
- Change the main jet and pilot jet for high altitude use.

High Altitude Carburetor Specifications

Main Jet	: #145
Pilot Jet	: #38

Wheels/Tires**Specifications****KL650-B2 Australian model and European model**

Item			Standard
Tires:			
Standard Tire:	Front:	Size	90/90-21 54S
		Make	DUNLOP
		Type	TRAIL MAX
	Rear:	Size	130/80-17 85S
		Make	DUNLOP
		Type	TRAIL MAX

MODEL APPLICATION

Year	Model	Beginning Frame No.
1989	KL650-B1	KL650B-000001
	KL500-B1	KL500B-000001
1990	KL650-B2	JKAKLEB1□LA004001, or KL650B-004001
	KL500-B2	KL500B-000501

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